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Meeting Agenda

CCICED 2012 Annual General Meeting Regional Balance and Green Development Agenda

Dec. 12-14, 2012

Diaoyutai State Guesthouse, Beijing

December 12, Wednesday

09:00-14:00 **Registration**

Morning

10:00 **Task Force and Special Policy Study Co-Chairs
Coordination Meeting**
Chaired by Chief Advisors of CCICED

11:00 **Bureau Meeting**
Chaired by CCICED Executive Vice Chairpersons

12:00 **Bureau Working Lunch**

Afternoon Plenary Session

Opening *Chaired by Mr. Zhou Shengxian*
CCICED Executive Vice Chairperson
Minister, Ministry of Environmental Protection of China

15:00 Welcome Remarks: *Mr. Zhou Shengxian*
Review and adoption of the meeting agenda
Adoption of CCICED Charter

15:10 Welcome Remarks: *Mr. Peter Kent, Minister,*
Environment Canada, CCICED Executive Vice Chairperson

15:20 Keynote Speech: *Mr. Li Keqiang*
Vice Premier, State Council, China; CCICED Chairperson

15:50 Coffee/Tea Break

16:10 Addresses and Special Remarks

Chaired by Mr. Peter Kent
CCICED Executive Vice Chairperson

1. Address by CCICED Vice Chairpersons:
By Mr. Xie Zhenhua, Vice Chairman of NDRC
By Mr. Børge Brende, Managing Director of World
Economic Forum

2. Special Speech: Mr. Zhou Shengxian, Minister of MEP
3. CCICED Issues Paper Presentation: Chief Advisors of CCICED
4. General Debate and Comments

18:00 Meeting Adjourned

18:30 Reception

December 13, Thursday

Morning Policy Research Reports (Plenary Session)
Chaired by Mr. Børge Brende, CCICED Vice Chairperson

09:00 Task Force on Policy Mechanism towards Environmental Targets for the 12th Five-Year Plan

09:20 Task Force on Strategy and Policies on Environment and Development of Western China

09:40 Environmental Strategy and Measure for Transformation of Development Mode in Eastern China

10:00 General Debate and Comments

10:20 Coffee/Tea Break

10:40 China's Marine Environmental Management Mechanism Based on the Case Study of the Oil Spill Incident in the Bohai Sea

11:00 Regional Air Quality Integrated Control System Research

11:20 General Debate and Comments

11:40 Introduction of the Draft AGM Policy Recommendations

12:10 Meeting Adjourned

12:20 Lunch

Afternoon Parallel Session

15:00-18:00

Open Forum 1: Regional Coordination and Green Development
Co-chaired by Mr. Achim Steiner, CCICED Vice Chairperson and Mr. Li Ganjie, CCICED Secretary General

1. Invited speeches
2. Debate and comments
3. Wrap-up

Open Forum 2: Strategic Transformation and Green Development

*Co-chaired by Mr. Børge Brende, CCICED Vice Chairperson
and Xu Qinghua, CCICED Deputy Secretary General*

1. Invited speeches
2. Debate and comments
3. Wrap-up

18:00 Meeting Adjourned

18:30 Dinner

December 14, Friday

Morning Discussion and Adoption of AGM Policy Recommendations to GOC (Plenary Session)

Chaired by Mr. Li Ganjie, CCICED Secretary General

- 09:00 Briefing on Parallel Open Forum Discussion
*1. By Mr. Achim Steiner, CCICED Vice Chairperson
2. By Mr. Xu Qinghua, CCICED Deputy Secretary General*
- 09:20 Introduction of the Revised Draft of AGM Policy
Recommendations
- 09:40 General Debate
- 10:10 Adoption of the Final AGM Policy Recommendations to the
Government of China
- 10:20 Coffee/Tea Break**
- 10:40 Closing Session**
Chaired by Mr. Achim Steiner, CCICED Vice Chairperson
- 10:40 Introduction of CCICED Work Plan in 2013
By Mr. Li Ganjie, CCICED Secretary General
- 10:55 Closing Debate and Discussion
- 11:40 Closing Remarks
*1. By Mr. Peter Kent, CCICED Executive Vice Chairperson
2. By Mr. Zhou Shengxian, CCICED Executive Vice
Chairperson*
- 12:00 Closing**
- 12:10 Lunch**

Afternoon **Courtesy Call to the State Leader of the Chinese Government (TBC)**
(Participants: International Council Members, TF international Co-Chairs, invited special guests)

Open Forum 1 of CCICED 2012 AGM

Regional Coordination and Green Development

Agenda

December 13, 2012

Four Season Hall, 1st Floor, Villa 10

Diaoyutai State Guesthouse, Beijing

Co-chairs:

Mr. Achim Steiner, CCICED Vice Chairperson,

Executive Director of UNEP

Mr. Li Ganjie, Secretary General of CCICED,

Vice Minister of MEP

15:00

Chair: Li Ganjie

1. Address by Co-chairs (10 minutes)
2. Leading speech (10 minutes each)
 - Ms. Erna Witoelar Council Member, former Indonesian Minister of Human Settlements and Regional Development
 - Mr. Fan Hengshan Director General of the Department of Regional Economy, NDRC
 - Mr. Simon Upton Council Member, Director of Environment, OECD
 - Mr. Zhai Qing Director General of Department of Planning and Finance, MEP
 - Mr. Drik Messner Council Member, Director of German Development Institute
 - Mr. Hu Angang Council Member, Professor from School of Public Policy and Management, Tsinghua University
 - Ms. Vanderweerd Council Member, Director of UNDP's Environment and Energy Group

16:30

Coffee/Tea Break

16:50

Chair: Achim Steiner

3. Leading comments (5 minutes each)
 - Mr. Tang Min Council Member, Counsellor of the State Council, Standing Vice Chairman of YouCheng China Social Entrepreneur Foundation
 - Mr. Hau Sing Tse Council Member, Executive Director of African

Development Bank

- Mr. Li Xiaojiang Council Member, President of China Academy for Urban Planning & Design
- Mr. Siebe Riedstra Council Member, Secretary-General of the Ministry of Infrastructure and the Environment

4. Debate and comments

17:50 **Wrap-up**

18:00 **Meeting Adjourned**

Open Forum 2 of CCICED 2012 AGM

Strategic Transformation and Green Development

Agenda

December 13, 2012

Conference Room, 2nd Floor, Fangfei Garden

Diaoyutai State Guesthouse, Beijing

Co-chairs:

Børge Brende, CCICED Vice Chairperson

Managing Director of the World Economic Forum

Xu Qinghua, CCICED Deputy Secretary General,

Chief Engineer on Nuclear Safety of MEP

15:00

Chair: Xu Qinghua

1. Address by Co-chairs (10 minutes)

2. Leading speech (10 minutes each)

- Mr. James P. Leape Council Member, Director General of WWF
- Mr. He Jiankun Council Member, Former Vice President
of Tsinghua University
- Mr. Roger Beale Council Member, Former Vice Minister
for Environment and Heritage of Australia
- Mr. Cheng Lifeng Director General of Department of
Environmental Impact Assessment, MEP
- Mr. Ashok Khosla Council Member, Former President of IUCN
- Lars-Erik Liljelund Council Member, former Director General of
Swedish Environment Protection Agency

16:30

Coffee/Tea Break

16:30

Chair: Børge Brende

3. Leading comments (5 minutes each)

- Mr. Li Xiaoxi Council Member, Honorary President of
School of Economics and Resource Management,
Beijing Normal University

- Mr. Lim Haw-Kuang, Council Member, Executive Chairman of Shell Companies in China
- Mr. Zhang Yuzhuo Council Member, General Manager of Shenhua Group Corporation Ltd., Academician of Chinese Academy of Engineering
- Mr. John Forgach Council Member, Chairman of Board of ForestRE Holdings

4. Debate and comments

17:50 **Wrap-up**

18:00 **Meeting Adjourned**

Remarks of Leaders

Developing a Modern China with Ecological Civilization

Keynote Speech at the Opening Ceremony

Li Keqiang

Vice Premier of the People's Republic of China, Chairperson of CCICED

(December 12, 2012)

**All Vice Chairpersons, Council Members and experts,
Ladies and gentlemen,**

I am very happy to be here again. I have attended many CCICED AGMs, and each time I am happy to see some old friends and to meet new ones. A moment ago, all Council Members have adopted the Agenda of this AGM and the Charter for the new phase of CCICED. The participants have shown their aspiration for strengthening international cooperation and promoting environment and development both in China and the world. The 18th National Congress of CPC has drawn a blue print for China's future development, with ecological civilization identified as the cornerstone for China's modernization. Taking "Regional Balance and Green Development" as theme, this AGM will discuss important issues regarding ecological civilization. I would like to take this opportunity to share with you some of my thoughts.

The concept of ecological civilization has originated from the government's reflection on development. The evolvement of human history is a history of civilization, and it is also a history of the relationship between man and nature. In the process, some ancient civilizations rose thanks to sound ecology, and some declined due to ecological deterioration. In the past 300 years, people have created a lot of material wealth as a result of industrialization. However, they have also paid a high cost of resources and environment. In the late 20th century, international communities began debating on issues such as "Limit of Growth" and "Only One Earth", and put forward concepts such as circular economy, green development and ecological civilization. The United Nations has held four Conferences on Environment and Development, and reached consensus on promoting sustainable development and addressing climate change, which has been gradually translated into actions in individual countries. We can say that ecological civilization is the inheritance and

innovation of agricultural civilization and industrial civilization, coherent with the course of human civilization.

Since ancient times, there have been beliefs in China that “The world runs under the law of nature” and that “Man are an integral part of nature”. The wisdom in the beliefs still enlightens us today. Since the 1970s, China has focused on prevention and control of pollution, and actively joined the world in environment and development endeavors. In the past 30 years since reform and opening-up, in its push for modernization, China has implemented basic national policies on resource conservation and environmental protection, taken effective measures, and slowed down the degradation to eco-environment. However, we clearly understand that China is still facing a grave situation in ecological environment. Relatively insufficient resources and limited environmental carrying capacity have become a new reality and the “short board” for development in China. Our vigorous promotion of the development of ecological civilization aims at breaking this bottleneck.

Building a modern China on ecological progress is a new task for us, as well as a due component in overall realization of the Xiaokang society. We should carry on the industrial civilization and, at the same time, vigorously develop ecological civilization. There is no precedent in human history for realizing modernization in such a big country like China with over 1.3 billion people. Protecting ecological environment on vast land is also a difficult task facing the world. Facing unprecedented opportunity and challenge, we must feel the sense of urgency as a “tightrope-walker”, and have the strong confidence as a mountaineer. The industrialization and urbanization of developed countries took place over several hundred years, and the same process is accelerating in our country. The contradiction between resources and the environment gradually occurred in developed countries over the past 100 years, which has compounded in our country over the past decade. Learning successful international experiences and lessons of failures, and giving full play of the advantage of late-development of emerging economies, we could avoid the old path of “pollution followed by treatment” and explore a new development path. China will further promote the concept of ecological civilization that stresses respect for nature, reconciliation with nature and protection of nature; incorporate the development of ecological civilization into the modernization drive; accelerate the transformation of economic development mode; protect the environment in the process of economic development and develop economy in the process of environmental protection; and achieve a win-win situation of economy, public welfare and protection of ecosystem through the transformation of development mode.

To build a modern China with ecological civilization, we must make more efforts in the following areas.

1) Transformation of development mode. China is the largest developing country in the world, and it is a top priority for China to promote its economic and social development. Environmental problems occur in the process of development, therefore, it should be addressed in the process of development. Besides, China's development should be both sustainable and scientifically based. China should take the modernization path for ecological civilization. Good ecological environment is the wealth that people cannot buy or borrow. It will not do to let people live in poverty even if the mountains are beautiful and water is clear, neither will it do to achieve a *Xiaokang* life with environmental degradation. We will optimize the development pattern of land space for production, everyday life and ecology. We will promote the development of key ecological and environmental protection and energy conservation projects. The investment in ecological and environmental protection in China will reach 3.4 trillion Yuan in the "12th Five-Year Plan" period. We will take energy saving and emission reduction as an important tool for structural adjustment, innovation and transformation of economic development mode. It is expected that CO₂ emission per unit GDP in China will go down by 17% in 2015 based on 2010 level. Only when we base development on sustained resources and environmental carrying capacity of the country can we have a good life today without worrying about tomorrow, and achieve sustainable development for future.

2) Benefiting public welfare. Both the promotion of modernization and development of ecological civilization are in essence for people and for people's overall development. With higher living standard, people have more urgent requirement for good eco-environment. Environmental issues have become an important concern for public welfare. People wish for a good living and working condition with more income. They also hope to enjoy blue sky, green land and clean water. The government has the responsibility to mobilize the strength and efforts of all stakeholders in prevention and control of pollution, solving all new environmental problems and addressing old ones. We should provide more ecological products in addition to supplying material and cultural products. Since the beginning of this year, China has carried out PM_{2.5} monitoring and made public the data in Beijing-Tianjin-Hebei area, the Yangtze River delta and Pearl River delta, and all municipalities and provincial capitals, and has taken targeted measures to strengthen its control. It is anticipated that some improvement of air quality will gradually be achieved after efforts are made over time. Protecting ecological environment is conducive to our nation, society, individuals and future generations. The home with

beautiful eco-environment is the common home for all, and needs joint efforts of all for its development. The whole society should raise ecological awareness. Everyone must start with him/herself in very endeavor. Every bit of effort in environmental protection conducts will converge into vigorous strength for development of ecological civilization.

3) Expanding market. Expanding domestic demands is a basic strategy for China's development. Synchronized promotion of industrialization, urbanization, information technology and modernization of agriculture has created a huge potential for domestic demand. The new type of industrialization and urbanization must be achieved at the backdrop of ecological civilization. It presents unlimited prospect of market and brings about large-scale ecological industries. The application of renewable energy, energy saving reform for buildings, and sewage and garbage treatment will give birth to a market with unlimited potentials and a new growth engine. Taking photovoltaic industry as an example, at present, China has a total installed capacity of less than 10% of annual output, and there is a huge potential for domestic market. Combining urbanization, we will take measures such as encouraging the application of solar energy power generation equipment and supporting on-grid of distributed power generation, expand greater market across the country, and facilitate sustainable and healthy development of photovoltaic industry. It is expected that the installed capacity of solar energy generating units will reach 50 million kW in China by 2020. If we say green environment is a treasure place, ecological industry will bring endless treasures. We should consolidate agriculture, strengthen manufacturing industry and expand service industry, and develop new advantages for development. We also need vigorously develop circular economy, energy saving and environmental industry as well as low carbon industry, and take command of economy.

4) Deepening reform. Reform and opening-up is the only way for development, in particular for the transformation of development mode. It also provides a strong momentum for modernization. Promoting the development of ecological civilization requires material support, driving forces as well as reform and institutional innovation. Energy saving and environmental protection involve profound reforms of production pattern and life style, as well as renewal of ideas and adjustment of interests. We must give play to the lever role of system and mechanism, and get rid of the dependence on traditional development path. This will need the acceleration of reforms of pricing, finance, taxation, administration and enterprises; improvement of the systems such as compensated use of resources, compensation for environmental damages and eco compensation; improvement of assessment, examination, rewards and punishment as well as accountability mechanisms; and enhancement of legal development in the

field of resources and environment. We will employ systems to encourage and constrain enterprises; employ laws to regulate and standardize conducts so that the biggest “dividend” of reform will be reflected in the development of ecological civilization, scientific development and the transformation of development mode.

5) Strengthening cooperation. Environment and development issues are challenging to the whole world, and promoting a green development is in the common interests of all countries. China is a big economic player in the world with vast land. Addressing well the issues in this aspect will be a great contribution to the mankind. We will take ecological conservation and environmental protection as an important area for opening up; continuously strengthen environmental cooperation with other countries and international organizations; and introduce and absorb advanced concepts, treatment technologies, management modes and good experiences. Our market is an open market with fair competition. We welcome foreign enterprises to develop ecological industry in China. China is a responsible country. We will promote the implementation of international environment conventions; take up our due position according to the principle of common but differentiated responsibilities, equity and respective capability; and join hands with other countries to address global climate change and promote environment and development.

Environmental protection is an important platform for development of ecological civilization. I hope that relevant departments, like environmental protection department and development and reform department, will work closely with local governments to facilitate regional coordinated development; strive for becoming leaders, promoters and enforcers for the development of ecological civilization; develop a target system and promotion methods for development of ecological civilization as soon as possible; improve systems, mechanisms and policy measures; and make new contributions to national development and improvement of public welfare.

Members and experts,

With a history of 20 years, CCICED has participated in and witnessed the progress of environment and development cause of China, carried out many studies on practical issues in environment and development, put forward many good policy recommendations in areas such as eco-compensation, circular economy, clean development and low carbon development, facilitated the development of relevant activities in China and made positive achievements.

The meeting today marks the beginning of a new phase of CCICED. I hope that all Council Members and experts will give further play to the role of CCICED as a bridge and tie in international environment cooperation, continue to expand research areas, attach more importance to sharing of achievements, and contribute to the sustainable development cause of China and the world.

Finally, I wish a complete success of CCICED 2012 AGM! I wish all Council Members and experts a pleasant stay, good health and happy family!

Thank you!

Promoting Ecological Civilization and Building Beautiful China

Special Speech at the Opening Ceremony

Zhou Shengxian

Minister of Environmental Protection, Chinese Executive Vice Chairperson of
CCICED

(December 12, 2012)

Dear Council Members and experts,

Ladies and gentlemen,

I am very glad to have in-depth discussions with my new and old friends on the topic of “Regional Development and Green Development” to seek solutions and suggestions for addressing the conflicts and difficulties in China’s environment and development. Today, I would like to share with you my views on promoting ecological civilization and developing a Beautiful China.

The recently concluded 18th National Congress of CPC has drawn broad attention in China and the rest of the world. The highlight of the Congress is to integrate the development of ecological civilization into the overall layout of Chinese-style socialism. It emphasizes the concept of ecological civilization of respecting, adapting to and protecting nature. It incorporates the development of ecological civilization into all aspects and whole process of economic, political, cultural and social development. The meeting calls for building a Beautiful China, achieving China’s sustainable development, and contributing to global ecological security. Just now, Vice Premier Li Keqiang indicated at the opening ceremony of CCICED 2012 AGM that, to build an ecologically civilized and modern China, we must focus on transformation of development mode, people’s wellbeing, market development, continuous reform and enhanced cooperation. He declared in the speech that promoting ecological civilization and building a Beautiful China has become a new responsibility for China’s environmental community. Everyone in the environmental protection community should act as a leader, promoter and practitioner in promoting ecological civilization and building a Beautiful China.

Ecological civilization is the integration of physical, spiritual and institutional achievements of human beings in the process of protecting and developing sound eco-environment. It is a kind of social form with harmony between human and nature, among individuals, and between individuals and the society. It is a systematic approach inherently built in all aspects and the whole process of economic, political, cultural and social development. To develop ecological civilization, we need to respect nature; strive to achieve harmony and co-existence between human and nature, environment and economy, as well as individuals and society; consider resource and environment carrying capacity; establish resource and environmental-friendly spatial layout, industrial structure, production mode and lifestyle; enhance sustainable development capacity; and develop a resource-saving and environment-friendly society.

As a brand new concept, building a Beautiful China has emerged when our country identifies the development of ecological civilization as one of the top priorities. It designates the deepening understanding of Communist Party of China on both concept and pattern of governance and more attention to governance capacity; bears the vision of a better future from generations of Chinese Communists; carries on the Chinese dream of “Youthful China”, “Beloved China”, “New China”, “Prosperous, Democratic and Civilized China”, “Harmonious China” and “Rejuvenation of the Chinese nation”; and describes bright prospect of ecological civilization.

A Beautiful China is the sum of the beauty of our era, society, life, people and the environment. It features continual and healthy economic development, continuous expansion of democracy, increasing soft power, harmonious and fair society, and sound and livable eco-environment. All these features are essential elements for a Beautiful China, and sound and livable eco-environment is the most important feature. Sound eco-environment can enhance people’s happiness, increase social harmony, improve development quality, thus, it will help achieve sustainable development of our country and rejuvenation of the Chinese nation.

A Beautiful China focuses on scientific development. China is a developing country, and development is still our primary task. To facilitate the development of ecological civilization and a Beautiful China, we will implement the basic national policy of resource conservation and environmental protection thoroughly. Under the prerequisite of sustainable carrying capacity of resources and environment, we will steer development and modernization towards a scientific development path which

features people-centered and sustainable development. In the words of general public, A Beautiful China means tons of gold and silver, as well as clean water and green mountains. We believe that, with adhering to scientific development and ecological civilization, the bright picture of a Beautiful China will be gradually unfolded in front of the world.

A Beautiful China seeks social harmony. Practices in developing a Beautiful China, improving environmental quality, enhancing ecosystem service function, providing eco-products and meeting new demand of the public for sound eco-environment will inject new impetus to the development of a harmonious society. The traditional diagram of Taichi implies that everything contains two opposite aspects, and the opposition leads to unity. Two opposite aspects form a harmonious integrity through coordination and integration.. Human beings, as part of nature, survive and develop in nature. Human and nature coexist in a holistic relationship of unity of opposites. Social harmony depends on the harmony between man and nature. The coordinated development, harmonious and mutualistic coexistence between human society and natural ecological system will be conducive to the development of a Beautiful China for everyone in the harmonious society.

A Beautiful China aims at achievement of ecological civilization. A Beautiful China is the objective for the development of ecological civilization, which is the only way towards building a Beautiful China. Development of ecological civilization requires advanced ecological ethics as value orientation; advanced eco-economy as physical foundation; well-established ecological civilization system as incentive mechanism; reliable ecological security as bottom line, and improved eco-environmental quality as ultimate objective. Building a Beautiful China follows the same direction and pace as the development of ecological civilization.

A Beautiful China strives for sustainable development. There are four historic leaps in the understanding of eco-environment since the world woke up to ecological and environmental awareness in the 1960s and 1970s. They are the first UN Conference on the Environment in 1972, the United Nations Conference on Environment and Development in 1992, World Summit on Sustainable Development in 2002 and the United Nations Conference on Sustainable Development in June, 2012. All these events have provided new concepts and models for the development of a Beautiful China.

At present, a new round of industrial and technological revolution, featured by

green economy and low carbon technology, is under vigorous growth. Sustainable development has become a current trend, and green growth, resource recycling and low carbon development has become a new direction. To integrate into this trend, the Chinese Government has addressed the strategies of developing ecological civilization and a Beautiful China, which requires us to thoroughly solve resources and environmental issues in line with civilization improvement; focus on economic, political, cultural, social and scientific development; and achieve harmony at a higher level between man and nature, between environment and economy, and between individuals and society. Development of ecological civilization and a Beautiful China also provides an advanced scientific concept and methodological guidance for improving sustainable development capacity and achieving China's sustainable development.

The development of a Beautiful China needs contributions from all walks of life and all sectors and industries. It also has different objectives, contents and requirements for different phases. It will require a top-level design, clear direction, objectives and tasks, as well as effective measures and substantial enforcement. The establishment of a resource and environmental-friendly spatial layout, and the adjustment of industrial structure, production mode and lifestyle are the basic requirements for developing ecological civilization. The core task for developing a Beautiful China is to attract public involvement; accelerate the development of resource-conservation and environment-friendly society; achieve the goals of economic prosperity, sound ecology and happiness of the people; provide more self-resilient space for nature; save more farmland to agriculture; and reserve a beautiful home with clean water, green fields and blue sky for future generations.

Dear members and experts,

The Chinese Government has always attached great importance to environmental protection. In the past few years, the Chinese Government has put environmental protection in an outstanding strategic position by setting up emission reduction as binding target for economic and social development, putting forward strategies such as development of ecological civilization, promotion of historic transformations of environmental protection and active exploration of new path to environmental protection, making great efforts in addressing prominent environmental issues that affect scientific development and threatening public health, and promoting important changes in understanding and practicing ecological environment protection in China.

Based on the remarkable achievements of environmental protection in the “*11th Five-Year Plan*”, we have made following significant progress in environmental protection in 2012:

1) Solid progress in reducing major pollution emissions. Focusing on thermal power plants, iron and steel plants, cement plants, paper plants, urban sewage treatment plants, livestock and fowl farms and vehicles (six plants and one vehicle), Chinese government has strictly carried out emission reduction. It is shown that COD emission was reduced by 2.11%, ammonia nitrogen was reduced by 1.98%, SO₂ was reduced by 2.72%, and NO_x was reduced by 0.24% in the first 6 months of 2012 compared with the same period of 2011.

2) Advanced function of environmental protection in optimizing economic development. MEP has conducted strict review and approval of environmental impact assessment (EIA) of construction projects and imposed stringent environmental requirement to the projects with “high consumption of energy or heavy pollution and resource use”. For public welfare projects, infrastructure projects and eco-environment development projects that meet environmental requirement and contribute to steady growth and economic restructuring, the review and approval of the EIA will be accelerated. Up to November 2012, MEP had reviewed and approved the EIA reports for 197 construction projects with a total investment of 1120 billion yuan. MEP had suspended the approval or returned the EIA reports or rejected the approval of EIA of 21 construction projects with a total investment of 94 billion yuan that failed to meet environmental requirements. At present, EIA in China is confronting with many new situation and problems. It requires more efforts to strengthen and improve environment impact assessment system through reform and innovation. Four most important measures are being implemented currently. Firstly, strengthen EIA according to related legislations and regulations. Secondly, enhance broader and effective public participation. Thirdly, make maximum information disclosure. MEP has conducted the practice of disclosing project application and simplified EIA reports, project review status and government commitment, as well as EIA approval and acceptance document. Fourthly, major construction projects must conduct social risk assessment.

3) Remarkable achievements in addressing environmental issues with public concerns. The newly revised *Ambient Air Quality Standard* has been released after it was reviewed and approved by the executive meeting of the State Council. The

new standard includes monitoring indicators such as PM_{2.5}, 8-hour average concentration of O₃. Monitoring of these indicators in key regions, such as Beijing-Tianjin-Hebei, the Yangtze River delta and Pearl River delta, as well as provincial-level municipalities and capital cities of each province has been conducted. The monitoring results are publicly disclosed. The prevention and control of heavy metals, chemicals and POPs pollution has been further addressed. PM_{2.5} monitoring, information disclosure and comprehensive control approach represent the transition of pollution control from simply focusing on primary pollutants to a new stage of addressing both primary and secondary pollution.

4) New progress in regional pollution control in key river basins. Based on the *Water Pollution Prevention and Control Plan of Key River Basins (2011~2015)*, MEP has conducted a comprehensive examination on the plan implementation in 8 provinces (autonomous regions or municipalities) along mid and lower reaches of the Yangtze River basin, and implemented ecological restoration programs for big rivers and lakes such as Songhua River. The State Council has approved the 12th Five-Year Plan for Air Pollution Prevention and Control in Key Regions. This Plan requires accelerating industrial restructuring of energy consumption pattern, carrying out synergy control of multi-pollutants and management of multiple pollution sources, and strengthening regional joint pollution prevention and control.

5) Enhancement of rural environmental protection and ecological conservation. MEP has issued the *12th Five-Year Plan for Comprehensive Management of Rural Environment*, which identifies the goal, main tasks and guarantee measures for rural environmental protection. The State Council has established *National Commission on Biodiversity Conservation*, and issued the *Work Plan on Implementation of "China's National Biodiversity Conservation Strategy and Action Plan (2011~2030)"* and *China's Action Plan for UN Decade on Biodiversity*, which have uplifted biodiversity conservation as a national strategic action.

Dear Members and experts,

Environmental protection is the main platform and fundamental measure for developing ecological civilization, and it is the key arena for building a Beautiful China. Breakthrough in environmental protection is the key for promoting a green, circular and low carbon economy, accelerating the pace of ecological civilization and creating a sound environment for people. Any achievement of environmental protection will positively contribute to the development of ecological civilization and

a Beautiful China.

1) Actively explore new path of environmental protection with Chinese characteristics that emphasizes environmental protection in the process of development and promotes economic development in the process of environmental protection. China is and will be at the primary stage of socialism for a long time. Insufficient development and lack of environmental protection coexist. It is difficult to achieve great economic development when resources and the environment protection are ignored. We will have to pay high cost if we concentrate on fast economic development. A new path of environmental protection that protects the environment in the process of economic development and develops economy in the process of environmental protection must be discovered. This is also a road sign toward a Beautiful China. To explore the new path of environmental protection, we will adhere to the guiding principles, follow the basic concept of low cost, high benefit, low emissions and sustainable development, and establish environmental protection systems compatible to China's situation. The systems include macro strategy system for environmental protection, comprehensive and highly efficient pollution prevention and control system, improved environment quality assessment system, complete environmental regulations/policies and science and technology standard system for environmental protection, sound environmental management and enforcement supervision system, and participatory social action system.

2) Develop the resource-saving and environmental-friendly spatial layout, industrial structure, production mode and life style. Spatial layout of national land development has strategic significance in protecting eco-environment. It further highlights the fundamental role of eco-environment in national economic and social development. According to the principle of balance among population, resources and environment and integration of economic, social and ecological benefits, we will control development intensity, adjust spatial layout, facilitate intensive and high-efficiency production, and create a sound livable environment with clean waters and green mountains. We will accelerate the implementation of main function zoning strategy and environment function zoning systems, identify and ensure ecological red line for important ecological function areas, sensitive and fragile land and marine eco-environment, promote regional development in line with the Main Function Zoning strategy, and establish a scientific pattern for urbanization, agricultural development and ecological security.

3) Make a great effort to achieve emission reduction target for major pollutants. We will strengthen emission reduction by enhancing industrial restructuring, refining pollution control for projects, and practicing supervision according to the Comprehensive Program on Energy Conservation and Emission Reduction in the “12th Five-Year Plan”. When striving for the control of total emissions, we will actively explore new approach to achieving reduction of total emissions targets and sustainability; prevention and control of various pollution factors and improvement of environmental quality; and more importantly, the prevention of environmental risks. We will implement major emission reduction projects and guarantee measures in “six plants and one vehicle”, improve the treatment capacity for urban sewage, and strengthen water pollution treatment in key industries such as paper industry. We will continuously promote emission reduction in power industry, accelerate desulphurization and denitrification in non-power industries, such as iron & steel and cement, and strengthen the control of NOx emissions from motor vehicles. We will strengthen examination on the performance of emission reduction target responsibility system and carry out strict accountability of such responsibility.

4) Address prominent environmental issues affecting scientific development and threatening public health. Environmental protection provides a solid foundation for scientific development. It also ensures public health. Protecting and improving environmental quality is the eternal theme of environmental protection, as well as the origin and the purpose of environmental protection. Under the current economic situation, we will pay close attention to “high energy consumption and high emission and resource-intensive” projects, low-level repetitive projects and projects with excessive capacity. We will continuously carry out special environmental protection campaigns by penalizing those enterprises that illegally discharge pollutants, and seriously investigate and punish all kinds of environmental violations. We will do our best to respond to unexpected environmental incidents to minimize the loss of life and property as well as the damage to eco-environment.

Enjoying a sound eco-environment is the basic right of the public, and ensuring a sound eco-environment is the basic public service that government should provide. We must ensure drinking water safety for the public and focus on addressing environmental problems that affect people’s life, such as the pollution of heavy metals,

chemicals, hazardous waste, particulate and POPs. I would like to emphasize the comprehensive prevention and control of fine particulate (PM_{2.5}) pollution. In 2012, we have monitored PM_{2.5} and O₃ concentrations in key regions such as Beijing-Tianjin-Hebei, Yangtze River delta and Pearl River delta, municipalities and provincial capitals and publicly disclosed the monitoring data as the first stage of the three-stage implementation program for the new *Ambient Air Quality Standard* approved by the State Council. The *12th Five-Year Plan for Air Pollution Prevention and Control for Key Regions* approved by the State Council in September of 2012, clearly puts forward a package of “coordinated, comprehensive and joint-action” policy measures for prevention and control of air pollution featured by PM_{2.5}. **Firstly, identify the target for prevention and control of PM_{2.5}.** It is expected that, PM_{2.5} concentration in key regions will be reduced by 5% each year on average by 2015. Higher requirement for key regions such as Beijing-Tianjin-Hebei, the Yangtze River delta and Pearl River delta regions was targeted by 6% reduction of annual average concentration.

Secondly, implement comprehensive measures. Regional environmental resources will be coordinated and industrial structure and layout will be optimized. We will strengthen cleaner use of energy and adopt a total coal consumption control at regional level; carry out synergy control of multi- pollutants and focus on the prevention and control of primary pollution as well as secondary pollution. Based on the total emission control of SO₂ and NO_x, we add flue dust and VOCs as new control indicators to the total emission control list. Eight emission reduction programs with a total of 13,000 emission reduction projects will be implemented, which will effectively reduce the emissions of all pollutants.

Thirdly, improve regional joint prevention and control of pollution. We will establish and improve the regional air pollution joint prevention and control mechanism with “unified planning, monitoring, supervision, assessment and coordination”, and improve overall capacity in joint prevention and control of air pollution for key regions.

5) Facilitate the development of pilot ecological provinces, cities and counties. China has developed pilot ecological province, city and county campaigns since 2000. Currently, 15 provinces (autonomous regions or municipalities) are working towards becoming Ecological Provinces. Thirteen out of the 15 provinces have issued an outline for development of ecological province. Over 1,000 counties

(cities and urban districts) have implemented the program of Ecological County. We will apply good models as guidance, conduct pilot activities, and take gradual steps based on local conditions to implement the demonstration programs for ecological provinces (cities and counties), environmental protection model cities, environmentally-beautiful villages, environment-friendly enterprises and green communities. We will make great efforts in promoting ecological civilization at micro-level to facilitate an overall societal force to promote ecological civilization and build a Beautiful China.

6) Accelerate the establishment of institutional mechanism conducive to the development of ecological civilization. Protection of ecological environment depends on institutional mechanism. We will establish a comprehensive management system for ecological environment with unified functions and high efficiency in coordination and operation. Oriented by developing ecological civilization, we will improve relevant legal systems; strengthen planning and policy guidance; utilize comprehensive economic instruments such as fiscal, taxation and pricing measures; establish and improve ecological compensation mechanism; deepen price reform of resource products and improve resource and environment economic supporting policies. In 2011, the total NO_x emission did not fall but rose instead. With the implementation of favorable pricing policy of 0.008 yuan subsidy per kW•h electricity for power plants with denitrification facilities, the total NO_x emission showed declining trend for the first time in the first 6 months of 2012. It has proven that correct economic policy is the right environmental policy. We will strengthen environmental supervision and improve the accountability system for eco-environment protection and environmental damages compensation system. Targets, indicator system and implementation methods for developing ecological civilization will be developed and integrated into performance evaluation for local government at all levels.

Dear Members and experts,

“There is still a long journey for us to go, and the long journey always starts with the first step”. We have adopted the Charter of CCICED Phase V this morning and officially commenced the work of a new phase of CCICED. I hope the new phase of CCICED will bring in multiple perspectives towards China and the World, carry on Chinese good tradition, give a full play with its wisdom and insights, draw on contributions from all stakeholders and provide practical and innovative policy

recommendations to China's environment and development!

Finally, I wish a complete success of CCICED 2012 AGM, and I wish you a good health and a happy stay in Beijing!

Thank you!

Speech at the Opening Ceremony

Peter Kent, Minister of Environment Canada, International Executive Vice
Chairperson of CCICED
(December 12, 2012)

Vice Premier Li Keqiang, Minister Zhou Shengxian, Secretary General Li Ganjie, Members of Council and invited guests,

Mr. Chairman—Vice Premier Li Keqiang -- I want to offer our warm congratulations to you on your continuing role as a member of the Politburo Standing Committee. We wish you great success for the demanding times ahead.

It is a welcome and significant matter that through you and others such as Premier Wen Jiabao, CCICED has maintained direct dialogue with senior leaders for two decades, and we look forward to this being continued in the years ahead.

This meeting is the first Annual General Meeting of Phase V, and therefore offers an opportunity to rethink how we go about our work, and perhaps stretch our thinking about what needs to be accomplished. It cannot be a “business as usual” effort. I would be surprised if the needs in Phase V mirror those examined in Phase IV work.

But before pursuing some further thoughts about our new phase, I want to welcome all of you. I am sure that those of you returning from past phases, whether as a CCICED member, participant in studies, or in other capacities, will want to provide insights from your experience.

I particularly wish to extend best wishes to our new Chinese and international members of CCICED. You are joining a unique body with a solid track record of providing useful inputs to solve difficult problems.

I am also joining CCICED for the first time, and feel honored to be granted the opportunity to serve as International Executive Vice Chair. I look forward to working with all of you to make this new Phase V of CCICED even more successful than ever.

Indeed, all the countries and organizations supporting CCICED are proud of the Council's past excellent work and impact. We hope our continued efforts will pay high dividends to both China and the world in the years ahead.

The issues of China's environment and development are growing more complex and demanding in terms of policy needs. Therefore our joint efforts must be robust and provide new insights. And, above all, lead to practical and implementable advice.

We can assume that our advice to the State Council will have to be sharply focused, and directed towards new and emerging problems as well as those requiring on-going attention. We need to formulate advice that truly does seek a transformative change in how environmental problems are perceived and acted upon.

While CCICED has the trust of many outside of the country, it is China most of all that has expressed the need and vision guiding CCICED's work. In this regard, we note the success of the 18th Party Congress in elevating the concept of "Ecological Civilization", or "Ecological Progress", to the highest national policy level.

By placing environment and development at the same level as the economy, culture and social development, China is sending an important signal—not only to its own people but also to the rest of the world—about its resolve and tenacity to create a new environment and development relationship. We must take this shift of thinking into account as we plan our future CCICED work.

This first year of CCICED's new Phase comes at a time when the global economic slowdown still persists and even worsens. We cannot avoid considering the impacts of this crisis on environment and economy relationships, the implications for green trade and investment, and, more broadly still, for the success of the multilateral agreements affecting environment and development.

A number of past and present CCICED members attended the Rio+20 Conference and Forum last June. CCICED held a very successful side event with a Round Table chaired by Premier Wen where it was possible to exchange views directly and with good insights. This session highlighted the need for a strengthened commitment to the concept of green development both globally and on the part of countries.

The implication for our work is that we may be called upon to provide advice

relating not only to China's internal needs but also on matters relating to international cooperation and China's growing role on the international environment and development stage.

The Rio+20 meeting emphasized green growth, green economy and green development. And, Mr. Vice Premier, you have underscored the need for Green Development in China to CCICED on a number of occasions. It is significant that China has gained valuable experience during the 11th Five Year Plan, and now in the first two years of the 12th Five Year Plan.

Over the coming years we can marshal CCICED's efforts around the subject matter of green development. I hope that would be helpful in focusing China's longer-term development strategy, as well as providing advice of more immediate value, including planning for the 13th Five Year Plan. I have seen the emphasis given to Green Development in the recent report "China 2030". It is an important time frame to consider in our future studies.

This year's studies and recommendations have examined topics concerning "Regionally Balanced and Green Development". We take seriously the observation by Premier Wen Jiabao and others that China's overall development pattern still appears to be "unbalanced, uncoordinated and unsustainable". How can green development overcome these challenges? That is the question driving our studies this year, and, I expect, for some time to come. The five study reports cover important ground.

Our Task Force on the 12th Five Year Plan makes suggestions about how best to meet the mandatory pollution control targets in an optimal fashion, and lays out some of the longer-term approaches that might guide future action during the 13th Five Year Plan and beyond.

A CCICED Task Force has examined the Western Development Strategy from a green development perspective, producing the outline for a green development roadmap suitable for this fast-growing region.

We also have undertaken three Special Policy Studies that are particularly relevant to the Eastern Coastal Region as it makes a transition to a more developed and post-industrial condition.

One of the Special Policy Studies examined green development in the three most

economically significant locations in Eastern China.

The second examined the serious emerging problem of regional air pollution especially as small particulate material (PM_{2.5}), or as we often call it smog.

The third study examined how China can develop a better emergency response to regional oil spills, suitable for reducing damage and high costs associated with incidents such as the Bohai Bay incident in 2011, and for preventing such events.

Granted, these studies do not cover the whole array of issues facing China's regional green development, but they have helped us to better understand the challenges and opportunities for green development in different locations and for a variety of issues.

The studies have considered the important role of local officials. And of enterprises relocating their production plants from one part of the country to another. The teams have tackled the problems of integrated approaches to management in each of the problem areas examined.

Last year, Mr. Chairman, in your remarks to CCICED, you noted that China needs an approach based on *“protecting the environment while developing, and developing while protecting the environment”*. You also characterized the *“new environmental protection way”* as *“small cost, good returns, low emission, and sustainable”*. We must keep these thoughts in mind as the Council formulates our recommendations this year, and in the future.

Colleagues, I have been impressed at the intensity and thoughtfulness of activities undertaken by the study teams. It is not a simple process to formulate the approach, form working relationships, and produce high quality reports in a year or less. I want to acknowledge their hard work, and particularly the efforts of the Chinese and international co-chairs of each team. CCICED could not operate without their inputs. We will have the opportunity to hear from each of them during the coming days.

I also wish to acknowledge the strong support of Minister Zhou for CCICED. We had the opportunity at Rio+20 to meet and discuss how important he believes the Council to be. His job is perhaps the most significant and demanding of any environment minister in the world today. I look forward to cementing our working relationship and friendship during this meeting.

We have five major opportunities ahead of us during our five-year term as members to offer advice of both immediate and lasting value. I am sure that we will do our very best to rise to the great challenges posed by China's development needs and their relationship to environmental protection. Let us take full advantage of this wonderful setting and of our renewed mandate to make this first AGM of Phase V an outstanding success in terms of the quality and relevance of our recommendations.

I am looking forward to our deliberations and getting to know each of you.

Thank you.

Enhancing International Cooperation and Promoting Ecological Civilization

Xie Zhenhua, Vice Minister of NDRC, Vice Chairperson of CCICED
(December 12, 2012)

Respected Vice Chairpersons, Council Members and experts,

It is my pleasure to attend the 2012 AGM of China Council for International Cooperation on Environment and Development (CCICED). First of all, on behalf of NDRC I'd like to express my warm congratulations to this AGM.

It has been 20 years since the founding of CCICED in 1992. I am attached to the Council for I have been involved in its planning, preparation, establishment and operation. The Chinese Government has attached great importance to CCICED, each phase of the Council is chaired by the leaders from the State Council and the Council Members were presented with the opportunity of talking directly to state leaders like Li Peng, Zhu Rongji, Wen Jiabao, Qiao Shi, Li Ruihuan, Li Keqiang and Song Jian. In each year of the past 20 years, the Council has proposed foresighted, strategic and cautionary policy recommendations to the Chinese Government combining China's practical needs and international trend and drawing upon the successful experience and lessons of China and the world in the field of environment and development through expert recommendations and dialogues between government leaders and Council Members. Many of them were adopted by the State Council, state departments and local governments. The Council has made extraordinary contributions to China's economic development and environmental protection. Taking this opportunity, I'd like to extend my sincere gratitude to all Council Members and experts for their excellent work and contributions.

It is a common challenge for all countries in the world to properly coordinate the relationship among economic development, social progress, energy and resources, ecological environment and climate change. It is also a big issue concerning China's overall social and economic development and people's wellbeing. As the largest developing country, China is at the critical stage of accelerating industrialization, urbanization and agricultural modernization and developing a *Xiaokang* society in an all-round way. The country faces a herculean task of developing the economy while protecting the environment and improving people's livelihood as its GDP per capita has just passed \$5000, plus unbalanced development and over 100 million

impoverished population. With a large population, relatively scarce resources, fragile ecosystems and extensive economic growth pattern, we have seen increasing restraint on economic development imposed by resources and environment. The per capita strategic resources of China such as freshwater, arable land, iron core, coal, petroleum and natural gas accounts for 28%, 43%, 17%, 67%, oil 7% and gas 7% of the world average, which support economic development. Meanwhile, the resource efficiency is not high. In 2010, China's resource productivity was only about 1/7-1/5 of that of Japan depending on different varieties of resources. In 2011, China's GDP was less than 10% of the world's total, but its energy consumption took up about 20%. Energy consumption per unit of major industrial products exceeds that of advanced international standard by 10%-20%. Big investment accompanied by large energy and resource consumption, high emissions, low productivity and less recycling, the unsustainable pattern has resulted in serious environmental pollution and ecological damage. Despite many positive policies that help curb or slow down environmental damage, the overall deteriorating trend has not been reversed. Environmental problems taking place in developed countries in different stages over the past 100 ~ 200 years have concentrated on in China during its fast economic development in the last 30 years, so that they become more complicated and tricky for us to handle. With regard to climate change, China becomes No.1 in the world in terms of GHG emissions and its per capita emission also reaches the world average. Although the past decade has seen marked decline in China's carbon intensity, emissions will keep on growing in a reasonable and controllable manner throughout its industrialization and urbanization process. Facing with more prominent impacts and threats of global climate change, China is under increasing pressure for emission reduction since Durban negotiation. Given China's current stage of development, technological level and management capability, we must abandon the traditional way of industrialization and urbanization and actively transform economic development mode and adjust economic structure in order to achieve the goal of developing a *Xiaokang* society in an all-round way. A path to a new type of industrialization and urbanization fit for China's national conditions will be the only choice.

The Chinese Government has always attached importance to resource conservation and environmental protection. Environmental protection is specified in every five-year plan with intensifying work, expanding areas and more stringent requirements. In the ninth and tenth Five-Year Plan periods, environmental governance focused on the prominent environment problems in key river basins and fields. The government has made more efforts in energy conservation and comprehensive utilization of resources. In the "11th Five-Year Plan" period, the government for the first time identified energy conservation and emission reduction as

a binding target for the development of national economy and social progress. The government has vigorously developed circular economy and introduced a set of effective policy measures. As a result, the following achievements have been obtained: 19.1% reduction of energy consumption per unit of GDP, saving a total of 630 million TCE, 1,460 million t reduction of CO₂ emissions, and 14.29% reduction of SO₂ emission, 12.45% reduction of COD discharge; higher resource productivity; 6.6% annual growth of energy consumption supporting 11.2% annual economic growth; reversing the rising trend of energy intensity and pollution discharge and strong support to fast and steady economic development. At the same time, China has nurtured green industries with certain scale by energy saving and emission reduction as well as development of circular economy. In 2011, the total GDP of energy saving and circular economy industries was about 2.3 trillion yuan RMB with 28 million employees. In the 12th Five-Year Plan period, the top priority will be green and low carbon development and promoting ecological progress.

The recent 18th National Congress of the CPC has placed ecological progress at an important position and incorporated it into all aspects and the whole process of economic, political, cultural and social development which form an overall arrangement supported by five pillars. The meeting calls for the development of a beautiful country and achieve lasting prosperity of the Chinese nation. It deepens and distills the Scientific Outlook on Development and reflects our care for nature and historical responsibility for future generations. It is also an inevitable choice in easing the restraint on socioeconomic development by resource and environment and realizing a Xiaokang society. Never has ecological progress been valued to so high a level.

The 12th Five-Year Plan period is a crucial period for China to promote ecological progress. We must uphold the concept of ecological progress; adhere to the state policy of conserving resources and protecting the environment; stay committed to green development, circular economy, low carbon technology in the process of industrialization, urbanization and agricultural modernization and accelerate the establishment of a green production and consumption pattern in order to meet the binding targets such as energy conservation and emission reduction, less carbon intensity, higher share of renewable energy and forest coverage. We will also control total consumption of energy, raise resource productivity, reverse the worsening trend of ecological degradation and speed up the pace of building a beautiful country, hence creating a good environment for the people. Meanwhile, taking the opportunity of promoting ecological progress, we will work hard to honor our commitment of 40%~45% reduction of CO₂ emission per unit of GDP by 2020 compared to 2005

level. Concrete actions are needed to promote ecological progress. NDRC has drafted the *Opinions on Accelerating the Promotion of Ecological Progress* and will work with related departments to do a good job in top-down design so as to drive green and low-carbon development. We will take the following major policy measures during this Five-Year Plan period:

First, optimizing spatial layout of land resources. We will accelerate the implementation of main function zone strategy, gradually develop national land development pattern that accommodates the needs of population, economic development, resources and environment and create a rational pattern for urbanization, agricultural development and ecological security. It is expected that by 2020, the area of forest land will increase to 3.12 million km², and the proportion of grassland will maintain at over 40% with more area of rivers, lakes and wetlands as well as green space.

Second, adjusting industrial structure. We will boost the development of strategic and new industries including service industry and environmental industry. By 2015, the proportion of added value of service industry will increase by 4 percentage points, reaching 47% and that of strategic industry will reach 8%. In particular, the share of environmental industry in terms of added value will reach 2% with a gross output value of 4.5 trillion yuan. We will raise higher standard for industrial access, strictly carry out energy conservation scrutiny and EIA of investment on fixed assets, keep a firm hand on energy-intensive and heavy pollution industries and continue with phase-out of backward production capacity.

Third, greatly facilitate energy conservation and emission reduction. We will strengthen target responsibility system for energy conservation and emission reduction by conducting regular check and extending the application of examination results. We will comprehensively facilitate energy conservation of key areas such as industry, construction, transport and public agencies. We will launch energy saving and low carbon activity in more than 10,000 companies and will save energy by 250 million TCE by 2015. We will carry out key projects for energy conservation and create a capacity of 300 million TCE in 5 years. We will speed up the implementation of the program of promoting energy-saving products benefiting the people. This year the central government has appropriated over 50 billion yuan for extension of energy-efficient products and equipment, which will help save more than 20 million TCE. All these measures will ensure meeting the target of 16% reduction of energy consumption per unit of GDP in the “12th Five-Year Plan” period.

Fourth, speeding up the development of circular economy. We will

vigorously develop circular economy in production, circulation and consumption in accordance with the principle of reduction, reuse and recycling. We will carry out demonstration projects on circular economy for various key projects, urban development, companies and industrial parks. We will establish a demonstration base on urban mining and reuse and disposal system for kitchen waste, foster some demonstration bases and backbone corporations for comprehensive utilization of bulk waste. We will promote comprehensive use of stalks and accelerate the development of a resource recycling and reuse system covering the whole society. It is expected that by 2015, the resource productivity will be increased by 15%.

Fifth, adjusting energy mix. We will facilitate diversified and clean development of energy sources and vigorously develop non-fossil energy sources. It is expected that by 2015, the installed capacity of will reach 290 million kW for hydropower, 40 million kW for in-service nuclear power plants, 100 million kW for on-grid wind power, 21 million kW for solar energy and 13 million kW for biomass. With these measures, non-fossil energy will account for 11.4% of primary energy mix.

Sixth, strengthening environmental protection. We will focus on some prominent environmental problems threatening public health such as unsafe drinking water, air and soil pollution, strengthen comprehensive control in order to make remarkable improvement in environmental quality. We will comprehensively facilitate environmental improvement of water source areas, strengthen the control of industrial pollution and prevention and control of water pollution in key river basins and regions. We will deepen the prevention and control of PM10 and PM2.5 pollution. We will facilitate the control of soil contamination and heavy metal pollution. We will do a good job in the treatment of municipal sewage and disposal of garbage. We will strengthen comprehensive environmental management in rural areas. It is expected that the total discharge of SO₂, COD, NH₃ and NO_x will be reduced by 8%~10% by 2015.

Seventh, promoting ecological protection and rehabilitation. We will strengthen protection and management of key eco function zones and create a strategic pattern of ecological security. Efforts will be made to protect natural forests, plant non-commercial forests and manage reserve forests. We will continue carrying out program of restoring farmland back to forest land and grassland and project of developing shelter forest; control sand sources; protect grassland ecosystems and promote key projects including ecological protection and development of key areas. It is expected that forest coverage and stock volume of forest will reach 21.66% and

14.3 billion m³ respectively by 2015.

Eighth, actively addressing climate change. We will control GHG emissions by means of industrial restructuring, improving energy efficiency, optimizing energy mix and increasing carbon sink with a view to reducing carbon emission intensity by 17% by 2015. We will improve our capacity in adapting to climate change in various key fields and alleviate the adverse impact of climate change on social and economic development and people's life. Pilot projects on low carbon province, low carbon city and emission trading will be launched in areas at different development levels. The pilot work has made positive progress. We will actively and constructively take part in international climate change negotiation, push for a fair and reasonable international climate system and make contributions to the protection of global ecological security.

Ninth, improving policy mechanisms. We will implement differentiated policies in different regions. Policies on investment, industrial development, finance, land, population and environment will vary according to different ecological functions in different areas. Therefore, performance evaluation will also vary. We will deepen the reform on the price of resource-based products. We will establish and improve taxation and market system conducive to ecological protection, pollution control and CO₂ emission reduction. Financial policies will provide stronger support for energy conservation and emission reduction. For instance, we will improve the policy of replacing subsidy with reward and reward-based pollution control, transfer payment, ecological compensation, energy efficiency benchmark, energy management contract, energy efficiency labeling and certification of energy-saving products.

Tenth, launching nationwide campaigns. We will nurture conservation culture and promote the mainstream value of ecological civilization. We will further carry out nationwide campaigns on energy saving and emission reduction and organize well the publicity activities such as National Publicity Week on Energy Conservation, Low Carbon Day and World Environment Day. We will give play to media's role to create a good atmosphere of public opinion. We will encourage consumers to buy energy-saving products, promote green travel, reduce consumption of disposable products and say no to excessive packaged goods. In this way we will gradually take a green lifestyle and consumption pattern.

Dear Council Members and experts,

Promoting green and low carbon development and ecological progress is not only an important strategic task for China to achieve sustainable development in the

new era, but also a movement in the common interests of all countries and global sustainable development. We are willing to employ CCICED as the platform to strengthen exchanges and cooperation in the field of environment and development with all other countries. We also welcome all Council Members and experts to contribute your comments and suggestions for China's green development and ecological progress. Let's join hands and shoulder the responsibility for China and human society, be realistic and visionary, and strive to achieve prosperity, affluence, social harmony and good environment.

Thank you!

Speech at the Opening Ceremony

Børge Brende, Managing Director of World Economic Forum, Vice Chairperson of
CCICED

(December 12, 2012)

Distinguished Minister Zhou, Minister Kent, Vice Chairman Xie, Vice Minister Li, Fellow Council Members, Ladies and Gentlemen,

CCICED is in a unique position as an institution providing advice on environment and development to China for many years.

A nation has to be brave to seek independent advice outside of the government corridors. China has shown, since the 1990s, through the establishment of the CCICED, that the nation is self-confident in seeking this kind of advice. As a council, we have the opportunity to make this fifth phase of CCICED an even more successful example of partnership by keeping our efforts focused on the most meaningful topics and potential outcomes.

We were even challenged today by Vice Premier Li Keqiang that we should expand our research and better share these outcomes with the public. I'm pretty sure that we are willing to step up to this challenge from the Vice Premier.

During the fourth phase of China Council, China, as a nation, demonstrated its economic strength during the world's economic downturn since the 1930s. During the past five years, when most economies in the western world have seen zero growth or contraction, China has grown 50% since 2008. China is now the second largest economy in the world, and is lending more money now to developing countries and emerging economies than the World Bank. In the future — and I think even today — developing countries look up to China, not just to Europe, the United States or other industrialized nations for inspiration in finding their development paths. This provides remarkable new opportunities for international cooperation and global progress for poverty reduction and environmental improvements.

This year's task force reports have provided evidence that much progress on environment and development has been made in China. During the 11th FYP, China

achieved emission reductions that normally occur during a later stage of industrialization. The efforts used to reach this goal helped the nation begin to restructure its economy and transform its growth pattern. At the same time, the progress made in China has not led to a level of environmental quality that fully satisfies the public.

China has shown that industrialized restructuring provides opportunities for environmental protection. As energy is used more efficiently other changes in production will take place. However, industrial restructuring in itself will not be sufficient to ensure further environmental progress. Towards 2020 China's environmental management system will have to be transformed from control of industrial single pollutants at relatively high costs to coordinate and multiple control mechanisms at lower cost.

President Hu Jintao told the 18th Congress of the Communist Party of China in November that the whole Party must purposefully apply the idea of "putting people first" in the country's development policies and plans. This principle and approach will address environmental and development concerns in China, especially in relation to environment impact assessments. As we know, environmental issues continue to cause concern on the part of local people in China. Therefore, I am very pleased that we will be examining social development issues as part of our future work in CCICED.

A people-centred approach will highlight that environment and development policies must be designed to protect public health. It will follow that official decisions must be based on scientific knowledge and the understanding that pollutants have impacts on human health and ecosystems, as well as on better economic and technological solutions.

This is a vast task for the government of China that likely will not be fully achievable in the short term. However, it marks a shift in focus from pollution control to environmental quality improvement. Environmental quality standards in watersheds, regions, and cities would then become drivers for emission control goals. Through these efforts, both quality goals and emission goals could be reached.

In pollution control and many other aspects of achieving environmental quality, transformative change will include moving from single issue to complex and coupled issues. Significant institutional strengthening will be required to ensure the necessary

coordination. We need to keep this point in mind during our deliberations. I am sure Mr. Zhou will advise us on this subject of institutional restructuring that has to be based on broad considerations.

This year's annual meeting has as its theme regional balance and green development. It is ultimately in the provinces and at local levels that environment and development issues are played out. Establishing a green regional development strategy that meets different regions' specific needs and challenges could be an important tool for signalling what the sustainable growth path in different regions should be. Like others, I have been impressed to see how environment has been mainstreamed into development thinking within China. I am very honoured to be part of the fifth phase of the China Council, which will work under the guidance of the very able Minister and of Vice Premier Li Keqiang, who underlined the importance of the environment from a historic perspective. Li Keqiang said that, in ancient China, high environmental standards and proactive environmental policy played a very important role, and that there was — and is — a clear correlation between a country's welfare and the way it deals with the environment. I think this shows a clear vision from the leadership of China in establishing and providing inspiration to building a true ecological civilization.

Thank you.

Summary Speech at the Closing Ceremony

Zhou Shengxian, Minister of Environmental Protection, Chinese Executive Vice
Chairperson of CCICED
(December 14, 2012)

**Council Members and experts,
Ladies and gentlemen,**

The three-day 1st AGM of CCICED Phase V is going to end today. Premier Wen Jiabao will meet with international Council Members, followed by a group photo session, and give an important speech this afternoon. Two days ago in the afternoon, Mr. Li Keqiang, Vice Premier of the State Council and CCICED Chairman, met with international vice-chairs at the AGM before delivering an important speech at the opening session on “Building a Modern China with Ecological Civilization”. He spoke highly of CCICED’s positive contributions to China’s environment and development. He hoped that, in the new phase, the Council Members and experts would continue to expand research areas, share results and findings, and make greater contribution in sustainable development both in China and the world. This has laid new tasks for CCICED.

The theme for the AGM is “Regional Balance and Green Development”, and the CCICED vice chairpersons at the podium either gave a speech or report on it. CCICED Chief Advisors presented the CCICED Issues Paper. This AGM had two open Forums with in-depth discussions on Regional Coordination and Green Development and Strategic Transformation and Green Development. The AGM listened to the reports of five research projects, including the Task Force on Policy Mechanism toward Environmental Targets for the ‘12th Five-Year Plan’ and others together with their policy recommendations. The Policy Recommendation Team carefully incorporated the comments and suggestions from the participants and made revision to the policy recommendations according to feedbacks. A moment ago, Council Members have reviewed and adopted the revised version of the recommendations in principle. The CCICED Secretariat will submit the policy recommendations to the Chinese Government according to procedures after the meeting.

Every CCICED AGM I have attended has left me with deep impressions. In

general, the CCICED has achieved a lot in the past five years in Phase IV, and we are hopeful that CCICED Phase V will see bigger achievement. I would like to share with you my three specifics. First, I always learn a lot and am enlightened every time I attend CCICED AGM. I am always impressed by the professional dedication shown by each vice chairman, Council Member, experts and staff. Secondly, it has been a trial for me, as the Minister of Ministry of Environmental Protection, to see the achievements of CCICED implemented. The policy recommendations of CCICED to the Chinese Government each year are the fruits of collective wisdom, from experience and lessons learn from past to future trend and directions. The policy recommendations of this AGM are to the Chinese Government at macro level and to the Ministry of Environmental Protection at work level. We will facilitate the adoption and application of these findings, and report back to the 2014 AGM on their status. Thirdly, CCICED has enhanced China's environment and development. The premier would endorse CCICED policy recommendations of each AGM, and instruct relevant departments and local government for further study and adoption. These policy recommendations have generated positive impacts on the expansion of China's environmental protection scope, raising the status of environmental protection in China and enhancement of environmental protection capacity.

Council Members and experts,

During this AGM, participants had good discussions, exchanged and shared experience and practice, stimulated new ideas and viewpoints and reached many common understanding, which is summarized in the following areas:

First, achievement of modernization with ecological civilization is the goal for China's environment and development. Vice Premier Li Keqiang pointed out that China should build its modernization with ecological civilization and thus set out the direction for us. China's biggest bottleneck issues in the development process are resource and environment, and how we handle these issues will impact people's well-being, the realization of a *Xiaokang* society and China's modernization. It is a strategic decision to promote modernization with ecological civilization, which is necessary in order to address the resource and environment difficulties, to raise the quality of development and to safeguard the global ecological security. Environmental protection is the main battlefield for ecological civilization. Environmental protection departments should shoulder the responsibility as leaders, promoters and enforcers for ecological civilization. Environmental authorities should accelerate the development of target systems and measures, taking into considerations the balance among population, resources and environment; as well as unity of economic, social and

ecological benefit. The concept of developing a modern China with ecological civilization has triggered strong resonance from all Council Members and experts. Participants believe that China will make contribution to the world development by putting environmental protection at the same important position as economic development.

Secondly, the concept of ecological civilization and China's rich experience is an important contribution to global environment and development. Since the 1960s and 70s, people have become more aware of environmental issues, and started taking strong stand and actions. There are four historic milestones for the world environment and development: the First United Nations Conference on Environment in 1972, the United Nations Conference on Environment and Development in 1992, the 2002 World Summit on Sustainable development and the United Nations Conference on Sustainable Development in June of 2012. China's environment and development is in synchronization with that of the world. China has made its share of contributions to each milestone. Since we entered this century, the Chinese Government has put forward a series of new thoughts and concepts, including ecological civilization, building a resource-saving and environmentally-friendly society, promoting historic transformation of environmental protection and active exploration of a new path to environmental protection, all of which have brought about critical changes to both the understanding and practice of environmental protection in China. As a late emerging economy, China has developed the concept of ecological civilization to tackle problems arising from environment and development, which is an addition to the world thinking in this area and relevant to other countries.

Thirdly, strict environmental access is the target-driven mechanism promoting coordinated regional development. China has a huge population with vast land areas and huge differences in economic development level, natural conditions, resource distribution, environmental carrying capacity and ecological status amount eastern, central and western regions, which poses prominent problems in unbalanced regional development. It is only after this issue is reasonably resolved that can domestic markets be expanded, more options be provided in economic advantages, and coordinated regional development be formulated. It will help avoid excessive development in some regions and reduce long distant transport of energy and resources including coal. At national level, we will develop National Zoning of Environment Function Areas, identify ecological red line in regions such as important ecological function areas, eco-environment sensitive and fragile areas at land and seas, and carry out strict environmental standards and differentiated environmental policies.

The eastern part of China should further enhance its capacity in environmental standards and prevention and control of pollution, make greater efforts in emission reduction, facilitate upgrading of industrial structure, and achieve growth with less pollutant and optimized development. The central and western parts of China should seize the opportunity to develop an economy suitable to local conditions, adhere to high standards, maintain strict environmental access, control total discharge of major pollutants, and achieve higher output with minimum pollutants and coordinated development.

Fourthly, exploring the new path to environmental protection that allows the protection of environment and economic development to have mutual benefits. To build a beautiful China, we must develop a resource-saving and environmentally-friendly society, and achieve economic prosperity, good ecology and happy life as specified by ecological civilization. The critical point is to put right the relationship between economic development and environmental protection. Environmental protection without consideration of economic development is the same as “climbing trees to catch fish”. Economic development without consideration of environmental protection is the same as “draining the pond to catch fish”. To achieve a balanced relationship between environment and development, we should actively explore the new path to environmental protection that protects the environment in the process of economic development and develops in the process of environmental protection, a milestone in China’s environment and development. Using this milestone as guidance, we should meet the basic requirements of low in cost, good in benefits, low in emission and sustainable in development. We will develop the land use pattern, industrial structure, production mode and life style that conserve resources and protect the environment, and facilitate the coordination and harmony between environmental protection and economic development.

Members and experts,

Time flies! CCICED has experienced 20 extraordinary years and witnessed the development and progress in China. The “12th Five-Year” period will be very important for developing an overall *Xiaokang* society. It is a period for deepening reform and opening-up, accelerating the transformation of economic development mode for China’s environment and development. It will be full of hopes and difficulties. I believe that this phase of CCICED will continue to contribute its wisdom to China and help with China’s environment and development.

Finally, please allow me, on behalf of CCICED Bureau, Ministry of Environmental Protection and myself, to extend heartfelt thanks to all experts,

scholars, governmental officials and the staff who have worked hard for the preparation and organization of this AGM!

Thank you !

Meeting Documents

CCICED 2012 Work Report

Li Ganjie, Secretary General of CCICED
(December 14, 2012)

As a high-level policy advisory institution in the field of environment and development, the China Council for International Cooperation on Environment and Development (CCICED or the Council) has received considerable attention and strong support from the Chinese Government over the past two decades. Senior Chinese leaders have attended CCICED Annual General Meetings (AGMs) and met with International Members 45 times. Premier Wen Jiabao has taken part in CCICED AGMs for 15 consecutive years since 1998, and has spoken highly of CCICED. He said: **“The strong vitality of CCICED lies in its focus on an eternal theme - sustainable development. CCICED is a platform, its importance not only reflected by the environmental cooperation between China and other countries, but also by China’s influence on environment and development globally. CCICED will continue and become better and better.”** In his opening speech at the CCICED 2011 AGM, Vice Premier Li Keqiang also spoke highly of CCICED activities and expressed his expectations for CCICED Phase V. He said: **“CCICED has been engaged in China’s environment and development over a long period of time, and has carried out a great number of fruitful activities. Many policy recommendations by CCICED have been adopted by the Chinese Government and have achieved positive results, which has contributed to China’s sustainable development. I hope that the new phase of CCICED will continue to take full advantage of the wisdom and vision of its experts, actively introduce advanced ideas and international practices, carry out in-depth studies on key issues based on China’s current and future needs in environment and development, and make its contribution to China’s transformative development.”**

In 2012, the global economy was still reflecting the impact of the financial crisis and was fragile and sensitive, which slowed momentum in global sustainable development. Although the United Nations Conference on Sustainable Development was a significant development in enhancing people’s understanding of environment and development issues, sustainable development still lacks strong commitment and cooperative action from the international community. The environment and

development process is facing unprecedented challenges. Under the background of a global economic slowdown, China's economic growth is facing continuous decline, and its "maintaining a steady growth" strategy has increased pressure on environmental protection. Facing this complex and grave situation, the Chinese Government has coordinated its plans for tackling environmental issues both at home and abroad, actively taking part in international cooperation and governance in environment and development, firmly promoting the development of ecological civilization as a national strategy, and actively facilitating the green transformation of its economic development mode. Based on the new situation, tasks, and requirements that China faces, the Government has taken a series of strategic measures. In particular, environmental protection has been strategically embodied in development, and embodied development environmental protection and China has actively explored a new path to environmental protection that is low in cost, high in benefits, low in emissions and sustainable in development.

CCICED entered its Phase V in 2012, and has conducted its work based on the objectives, tasks and policy research directions identified in CCICED Phase V's mandate. Under the strong leadership of the Bureau and with the support of Chinese and international partners, CCICED has successfully completed its work this year and has met expected objectives. Some areas of progress in 2012 are the following:

I. The Success of CCICED Rio + 20 Side Event highlighting the role of CCICED as a high-level international platform for dialogue on environment and development policy.

CCICED held a Side Event at the United National Conference on Sustainable Development (Rio + 20) in Rio de Janeiro, Brazil on June 21, 2012 with the theme "Rio + 20, CCICED at 20". Mr. Wen Jiabao, Member of the Standing Committee of the CCCPC Political Bureau and Premier of the State Council, chaired the meeting and exchanged his views with participants on relevant issues related to sustainable development in China and the world.

The CCICED Rio + 20 Side Event was CCICED's first overseas event and its success is reflected in the following six aspects:

1. CCICED Rio + 20 Side Event was the only high-level Chinese interactive side event attended by a State Leader during the United Nations Conference on Sustainable Development. The attendance of Premier Wen and the warm and candid discussion between Premier Wen and international participants demonstrated the strong support on the part of the Chinese Government and Premier Wen Jiabao for

CCICED. It further demonstrated the important role and significance of CCICED as a unique high-level international policy platform for dialogue on China's environment and development.

2. The side event attracted considerable attention from Chinese and international stakeholders. The participants in the side event were of senior rank and from a wide range of areas. The Chinese participants included 13 ministry leaders from the Ministry of Environmental Protection, Ministry of Foreign Affairs, NDRC, Ministry of Finance, Ministry of Agriculture, Ministry of Commerce and the Research Office of the State Council. International participants included heads of such international institutions and organizations as UNEP, WWF, World Business Council for Sustainable Development and ADB, as well as 12 ministry-level officials from Germany, Italy, Denmark, the Netherlands, Australia, Sweden, Japan and the United States. A total of 16 Chinese and international Council Members attended the meeting.

3. The Side Event covered a wide range of topics, including significant challenges facing China, understanding of the world situation, matters related to China in its external relationships, and the value of CCICED and possibilities for applying this model of international cooperation elsewhere. Some international participants commented that, through his answers and statements, Premier Wen Jiabao demonstrated his personal as well as the Chinese government's commitment to enhancing the relationship between environment and development and China's commitment to for sustainable development. The recognition of the commitment and achievements made by China at the Rio + 20 side event may be seen as a turning point and demonstrated that China can be a sources for new ideas, technology and experience in environment and development.

4. The appreciation and full affirmation given by Premier Wen Jiabao to CCICED have greatly strengthened the confidence of Council Members, donors and partners and their willingness to support the long-term development of CCICED.

5. The Side Event received active media attention. CCTV evening news aired a 3-minute program on the meeting. All major newspapers and network media in China reprinted in full the speech by Premier Wen Jiabao.

6. CCICED used in this case a large international conference as a platform for sharing CCICED experience and achievements over the Council's past 20 years, as well as for expanding the understanding of international communities about CCICED and for further enhancing CCICED influence internationally.

II. Implementation of CCICED Phase V activities

In 2012, all activities planned for the first year of CCICED Phase V were launched effectively and made substantial progress thanks to the strong support of the Chinese Government, active promotion of Ministry of Environmental Protection and close cooperation of CCICED's major donors and partners. They included the following:

(I) Nomination of the Members for CCICED Phase V

Twenty years of evolution and growth has enhanced CCICED's role as a high-level mechanism for dialogue and cooperation on environment and development policies between China and the international community, engaging the highest level of government and exerting considerable influence on policies on environment and development. Its achievements are inseparable from the prominent role played by Chinese and international Members. As one of the important activities of the new phase of CCICED, the nomination and appointment of the Council's membership have been completed after consultation with many stakeholders. There are 57 Members in CCICED Phase V, 32 Chinese Members and 25 International Members.

The Council's Phase V membership comprises approximately 50% new Members. In comparison to that of Phase IV, Phase V membership has the following three major characteristics: First, diversification in areas of expertise was accomplished by including members with backgrounds in such areas as energy, resources, environment, ecology, society, economy, finance, law, macro policy, regional development, and academe. Second, a balance was struck between regions and countries by including representatives from major developed countries and economies, developing countries, emerging economies, international organizations and institutions, as well as NGOs and enterprises. Third, an age balance was achieved by including younger Members.

(II) Completion of the draft Charter for CCICED Phase V and supplementary provisions

The draft Charter for CCICED Phase V and its supplementary provisions has been compiled and improved after communication and consultation with major donors and partners of CCICED and after internal procedures were completed on the Chinese side, to prepare for its review and adoption at the first AGM of CCICED Phase V in December 2012.

The CCICED Phase V Charter has two major characters. First, it inherits the

objectives, tasks, organizational structure and operational mechanisms identified for Phase IV. Second, it makes necessary changes and improvements based on the changing domestic and international situation and includes more attention to the interaction and implications of environment and development issues both in China and globally; provides for policy recommendations to the Chinese Government that focus on more active participation in global environment and development processes; further enhances the organization and management of policy research projects in order to strengthen the influence and relevance of CCICED policy recommendations; includes provision for conducting policy demonstration projects to improve the workability and feasibility of policy recommendations; expands activities to publicize the findings of CCICED to Chinese and international stakeholders through various channels and methods; strengthens capacity building of the Chief Advisors and their supporting group as well as the Secretariat and improves the overall management and operation of CCICED.

(III) Identification of priority areas for policy research in CCICED Phase V

Policy research and policy recommendations to the Chinese Government on environment and development are basic activities and the core mandate of CCICED. Understanding its position and historic mission, CCICED's new phase will identify guidelines, objectives and tasks for policy studies; place China's economic and social development stage in the context of current conditions as well as past experience; give priority to the "12th Five-Year Plan" while looking forward to the "13th Five-Year Plan"; aim at the achievement of *Xiaokang* society comprehensively by 2020; focus on the development of ecological civilization and achievement of a resource-saving and environment-friendly society; carry out studies on difficult and key environment and development issues at the macro, medium and micro levels; and put forward far-sighted, strategic, and feasible policy recommendations to the Chinese Government. In the next five years, CCICED will concentrate on topics such as regional balance and green development, environmental and social issues in the process of green transformation, management and policy innovation for green development and China's role in global green development as priority areas for policy research. Its work will not only serve China's green transformation and social progress, but also contribute to global sustainable development.

(IV) Fund raising for CCICED Phase V has obtained expected achievement

Through various forms of communication and consultations over the past year, CCICED Phase V has secured financial and intellectual support from a wide range of Chinese and international stakeholders. In order for CCICED to play an even more

significant role, the Chinese government has doubled its financial support to Phase V compared to its Phase IV contribution. Some major donors have also increased their financial support to CCICED. To date, approximately \$24 million in operational funds are in place.

It should be noted that CCICED's cooperation framework has gradually changed from development assistance to bilateral environmental cooperation. Major donors to CCICED, including Canada, Sweden and Germany have confirmed that they have shifted their CCICED support programs from bilateral development aid to bilateral environmental cooperation. This has put CCICED's long-term development on a more solid foundation.

III. Relevant Policy Research

In 2012, CCICED launched a series of policy research projects focused on the theme of Regional Balance and Green Development, in preparation for the 2012 AGM and the preparation of policy recommendations for the Chinese government.

1. Completing policy research on schedule

The CCICED has completed the following two task forces and three special policy research projects in 2012; their research findings will be presented to the 2012 AGM:

- (1) Task Force on Policy Mechanism Towards Environmental Targets for “12th Five-Year Plan” (2011-2012)
- (2) Task Force on Strategy and Policies on Environment and Development in Western China (2011-2012)
- (3) Environmental Strategy and Measures for Transformation of Development Mode in Eastern China (2012)
- (4) Regional Air Quality Integrated Control System Research (2012)
- (5) China's Marine Environmental Management Mechanism Based on the Case Study of the Oil Spill Incident in the Bohai Sea (2012).

Meanwhile, the following two new task forces were established following approval by the Council's 2011 Bureau Meeting and AGM. They will report their findings at the 2013 AGM.

(1) Environmental Protection and Social Development (2012-2013)

(2) Consumption and Green Development (2012-2013)

2. Important role of Council Members and donors in policy research

Four Chinese and International Council Members have served as co-chairs of research projects, contributing considerable time, energy and wisdom through direction involvement in and coordination of research, field trips, information exchanges and workshops leading to high quality reports. The financial and expertise contribution from CCICED donors and partners to the research has played an important supporting role.

3. Strategic ‘Salon’ held in success

CCICED Strategic ‘Salon’ is an innovation for policy research in Phase V. It aims to establish a new platform to provide new instruments and explore new pathways for enhancing the study of major issues. A group of senior experts will be gathered for brainstorming on research topics from a multidisciplinary perspective and through a combination of theory and practice. They will focus on current difficult and key issues in the field of environment and development in order to make the Council’s policy recommendations more forward-looking and strategic. According to the Council’s 2012 work plan and with careful arrangement, the first CCICED Strategic ‘Salon’ was held in October. The meeting attracted a number of renowned Chinese experts and scholars in economics, sociology and environment, whose information, analysis, views and suggestions will serve an active role in enriching and expanding the Council’s policy research. The ‘Salon’ has also helped extend CCICED’s influence in related fields in China. It will continue as a ‘branded’ institutionalized activity and will inject new vitality into the Council’s policy research.

IV. Operation and Management of the Council

Over the past year the Council has made a number of improvements in its operation and management that have contributed to its successful implementation of its work.

1. Chief Advisors and the Supporting Experts Group

CCICED Phase V will continue to use the established work mechanism engaging the Chief Advisors and their supporting expert group, for, among other duties,

providing direct support to the Council's policy research. To strengthen the functions of the Chief Advisors in Phase V, an assistant to the Chinese Chief Advisor has been appointed, and an international expert and a domestic expert have been added to the supporting expert group.

The work mechanism for Chief Advisors has worked well in the course of the year. They have played a more prominent role in advising the Secretary General on policy research, which has been instrumental in securing the smooth progress of the Council's work. Their main activities include the followings:

(1) Strengthening guidance on policy research

The Chief Advisors provided comprehensive advice to the Secretary General on Task Forces and other policy research projects and provided advice, guidance and assistance to the policy research teams. Various mechanisms ensure effective communication between Chief Advisors and the TFs. The newly revised "*Work Mechanism for CCICED Chief Advisors*" specifies detailed tasks for the Chief Advisors. They include drafting project concept paper, examining and approving work programs, and reviewing mid-term research findings and final reports, all of which will help improve the quality of research reports.

(2) Cooperating with the Secretariat to carry out various tasks

Joint Meetings of CCICED Secretariat and Chief Advisors were held five times in 2012 and the Chinese Chief Advisor and the supporting experts group held regular monthly work meetings. These meetings ensured close cooperation and consultation between the Chief Advisors and the Secretariat and effective operation of various tasks.

(3) The Chinese and International Chief Advisors attended the Council Rio+20 Side Event and supported the preparation of relevant documents.

(4) Drafting documents for AGM

The Chief Advisors support team has completed their tasks as planned, including the draft of *Policy Recommendations of 2012 AGM, Issues Paper, Progress on Environment and Development Policies* and *Report on CCICED Policy Recommendations Impact*. Their efforts will contribute significantly to the success of the 2012 AGM.

(5) Studying and identifying directions and priority areas for policy research

during CCICED Phase V

With careful study and extensive consultations both at home and abroad, the support team and International Chief Advisor have drafted a framework for the directions and priority areas for policy research during Phase V, and set the objectives and tasks for the next stage. This document will lay a solid foundation for policy research over the next few years.

2. CCICED Secretariat and its International Support Office

The year 2012 is a transitional year for the Council. The Secretariat and its International Support Office have faced a variety of complex tasks. Thanks to the leadership of the Executive Vice Chairperson and the Secretary General, the cooperation of Chief Advisors and their supporting experts group, the Secretariat has completed all its tasks successfully.

(1) Management of policy research projects.

To strengthen management of policy research projects, the Secretariat has prepared the *Measures related to the Management of CCICED Research Projects* as a supplement to the Charter of CCICED Phase V to regulate the implementation and operation of various types of policy research projects. Meanwhile, the Secretariat and its International Support Office have strengthened the guidance and coordination on the establishment and operation of task forces and special policy studies, providing comprehensive support and assistance to project teams. In the course of the implementation of the four task forces and three special policy research projects in operation in 2012, the Secretariat organized and attended over 40 related meetings and activities, which have ensured smooth operation of all the research projects.

(2) Organizing and preparing the CCICED Rio+20 Side Event.

To organize and prepare the CCICED Rio+20 Side Event was a complex challenge and test for the Secretariat. First, the delegates were high-level officials. Arranging their participation required close coordination and confirmation beforehand and attention to exacting requirements on the form, content and outcomes of the meeting. Second, the meeting venue was in Rio de Janeiro. The less-than-ideal accommodation and working conditions presented great difficulties and uncertainty in the preparation work. Third, there were limited manpower and funding resources, which demanded careful planning. In spite of these difficulties and adverse conditions, the Secretariat staff worked steadily and conscientiously, and, with the active support from all parties, and particularly with the significant contribution GIZ of Germany,

the side event was a great success, attracting significant attention from domestic and international audiences. In the end, the Council accumulated rich experience that can be applied when holding similar activities and the Secretariat has strengthened its capacity.

(3) Preparing for CCICED Phase V.

Preparing the launch of CCICED Phase V was one of the key tasks for the Secretariat in 2012. The Secretariat completed a variety of tasks as scheduled, such as nominating Chinese and International Council Members and submitting the list of candidates for approval, drafting the Charter for CCICED Phase V and supplementary Annexes, obtaining input on the direction and priority areas for policy research, and putting in place operating funds for the new phase of the Council.

(4) Strengthening contact and communications with Chinese and International Council Members and partners.

A total of 10 issues of newsletters in electronic form were distributed to disseminate information about the Council over the course of the year. The Secretariat listened to and adopted suggestions from its partners to further improve the work of the Council. It also has invited Council Members and partners to participate in Council activities and provided services to them.

(5) Secretariat capacity building.

The Secretariat applied more stringent requirements to its work, strived to apply better overall management skills, and sought to improve its performance through various courses and training programs at home and abroad. In the meantime, it further standardized fund management procedures to ensure the smooth operation of policy research and other activities.

V. Dissemination of the Achievements of CCICED

The Council's activities and achievements have been disseminated in different formats and through a variety of channels to expand CCICED's influence. The effort has had had positive results.

1. Active outreach overseas.

Taking advantage of major international events related to environment and development activities, CCICED actively strengthened its communications and expanded its outreach overseas in 2012. Apart from holding the CCICED Rio+20

Side Event and Exhibition, the Council also joined with WWF to hold a side event at the 5th Ministerial Conference of the Forum on China-Africa Cooperation in Beijing. The Council was also invited to the Regional Workshop on Green Economy held in Mozambique and several other countries' and organizations' side events during Rio+20. By sharing its achievements with the international community, the Council has attracted wider international attention.

2. China's mainstream media gave special coverage to the CCICED Rio + 20 Side Event. The Council's AGM was broadcasted live online. Newspapers, magazines and other forms of media have been utilized to promote the Council's policy research achievements and policy recommendations.

3. Printing and distributing publications.

The Council has compiled and distributed more than 10,000 copies of its publications including the *Proceedings of the 2011 AGM*, *Annual Policy Report 2011*, *Work Report of CCICED 2011* and *CCICED at 20: Activities, Impacts and Future Opportunities*.

4. Improving the Council's website in Chinese and English

The Council's website underwent comprehensive revision in both Chinese and English, including design of the website and of its various pages, their contents, and links. The website is now more informative with timely updates and convenient search tools and is easier to navigate. Its access rate has increased by 25% compared with the same period last year.

Appendix:

China Council for International Cooperation on Environment and Development (CCICED)

Phase V (2012-2016)

Report on Funding: 2011-2012

Introduction

Phase V of the China Council for International Cooperation on Environment and Development (CCICED) will be inaugurated at the December 2012 Annual General Meeting. However, due to the timing of the AGM and the availability of financial data, this report on funding covers the period from 1 October 2011 to 30 September 2012, and thus encompasses the final months of Phase IV as well as the initial months of Phase V.

Phase V contributions

The Council's operation and activities for Phase V are supported financially by the Government of China and a wide range of international donors. Details of donors' contributions or commitments as of September 30, 2012, appear in Table 1. Contributions were made in a number of currencies. The USD\$ equivalent amounts shown were calculated using rounded exchange rates valid on 30 September 2012. The real US\$ value of a contribution will vary depending on when it was made available and when it was used over time to meet Council expenses.

Core Funding and Dedicated Funding

As in earlier Phases of the Council's work, funding can be categorized as Core Funding and Dedicated Funding. Generally, Core Funding can be deployed flexibly to finance the full range of the Council's operations, including the Annual General Meetings, Task Forces/Special Policy Studies, Roundtable Meetings, Chief Advisor Group, and the Secretariat, and thus helps ensure that the Council can respond in an unrestricted and prompt manner to changing priorities and circumstances. Dedicated Funds are funds that are provided to the Council for a specific purpose, usually to support the work of a particular Task Force, Special Policy Study, or pilot project. These Dedicated Funds are concentrated on policy studies and help ensure that high-priority policy research activities have access to sufficient resources.

Management of funds

Most funds are administered by the Council Secretariat (SERI) in Beijing or by the Secretariat International Support Office (SISO) situated at Simon Fraser University in Canada. During the initial months of Phase V, SISO managed the contributions to the Council on the part of CIDA, AusAID, and Energy Foundation, as well as funds provided by the Secretariat from Norway's and Sweden's contributions that are allocated to meet the international costs of specific task forces. In a few instances, donors manage their contributions through their own offices.

During 2011/12, the Secretariat and SISO have continued to apply standard Guidelines on the use and management of funds used to meet international costs related to task forces. These Guidelines establish standards and limits for reimbursable costs, which were based in turn on the regulations and other conditions set by major donors on the use of their funds, and are designed to ensure consistency across all task forces. In addition, a number of procedures and contract and other templates are used to facilitate task force financial management.

Expenditures 1 October 2011 – 30 September 2012

Table 2 displays expenditures from 1 October 2011 to 30 September 2012 by donor. Some of these expenses were paid during the final months of Phase IV. Consequently the table shows actual amounts expended, regardless of whether they covered Phase IV or Phase V costs or were paid from donors' Phase IV or Phase V contributions. Expenditures for this period totalled US\$ 5,007,571. A number of other costs related to this period were processed through donor financial systems either before or after the October 2011 – September 2012 period and were included in last year's data or will appear in the 2012-2013 figures.

TABLE 1				
CCICED PHASE V – DONOR CONTRIBUTIONS / COMMITMENTS AS OF SEPTEMBER 2012				
	Donor	Amount in original currency	Approximate value in US\$ at 30 Sept 2012 rates (see Note 1)	Details
1.	China	CNY 40,000,000	6,350,000	
2.	Canada	CAD 7,290,000	7,290,000	
3.	Norway	NOK 25,000,000	4,300,000	
4.	Sweden	SEK 10,000,000	1,500,000	Fund for 2012-2013. Fund for 2014-2016 to be confirmed later.
5.	Germany	EUR274,134	358,205	For year 2012. Fund for 2013-2016 to be determined later.
6.	Australia	AUD 1,500,000	1,530,000	
7.	Italy	EUR 500,000	650,000	
8.	The Netherlands	EUR 500,000	650,000	
9.	US EDF	USD 650,000	650,000	
10.	Shell (China) Limited	USD 600,000	600,000	
11.	UNDP	USD 40,000	40,000	
12.	Energy Foundation	USD 200,000	200,000	Fund for 2012. Fund for 2013-2016 to be determined later.
13.	University of Hong Kong	HKD 1,500,000	200,000	Fund for 2012. Fund for 2013-2016 to be determined later.
	TOTAL (USD\$)		24,318,205	
<p>Note 1: the value in US\$ of a contribution will vary depending on when it was made available and when it was used over time to meet Council expenses. To provide notional amounts based on a consistent exchange rate, rounded rates valid on 30 Sept. 2012 were used.</p>				

Table 2
Expenditures: CCI/ED Phase IV: October 2011 - September 2012 (US dollars)

Category	China	Canada	Australia	Norway	Sweden	HKU	Germany	Italy	Netherlands	SHELL	EDF	UNDP	EF	Total
1. Task Forces / Special Studies														
Innovation														0
Low-Carbon Economy		(120,055)	(30,569)		104,032									-46,592
Green Development		(126,902)	2,755	285,551										161,404
Low Carbon Industrialization	30,220	62,879	(11,521)	119,213	49,505									250,296
Investment and Trade		(136,871)	(23,040)	173,802	56,998									70,889
China E&D Outlook	32,260	(134,769)		141,823	128,000									167,314
Special Study: China's Marine Environment		11,454											6,337	17,791
Western China Env and Devt.	64,520	359,309	18,724											442,553
12th Five-Year Plan	38,710	124,656	11,044	129,029			27,499							330,938
Mercury Pollution		87,102	10,235		84,093									181,430
Green Consumption		4,525												4,525
Other policy background reports														0
Sustainable consumption	74,680						34,128							108,808
Social development	86,180											40,000		126,180
Special Study: Regional Air Quality	76,640						199,439			32,258				308,337
Special Study: Bohai Oil Spill	64,520									24,194	150,000			238,714
Special Study: Eastern China	48,390					200,000								248,390
Pilot project preparation	43,550													43,550
CCI/ED Strategic Salon	13,470													13,470
Subtotal	573,140	131,329	(22,372)	849,418	422,628	200,000	261,066	-	-	56,452	150,000	40,000	6,337	2,667,997
2. Council AGM	80,645	228,903	138,999	124,952	103,775									677,274
3. Rio Side event	48,387	(10,858)			37,097		97,138		48,387	41,936	50,000			312,087
4. Secretariat operations (SERI)	290,322							96,774						387,096
5. Chief Advisor Group	161,290	312,814												474,104
6. SISO Administration / Training		489,013												489,013
Total expenditures	1,153,784	1,151,200	116,627	974,370	563,500	200,000	358,204	96,774	48,387	98,388	200,000	40,000	6,337	5,007,571

Policy Recommendations to the Government of China

Beijing, December 12-14, 2012

The first Annual General Meeting of CCICED Phase V was held in Beijing during December 12-14, 2012, with the theme of *Regionally Balanced and Green Development*.

The CCICED members observed that the 18th CPC Congress Meeting provided a clear roadmap towards green prosperity and a 'Beautiful China'. At the 18th CPC Congress Meeting, it was accepted that the Government of China put Scientific Development strategy as a highest guiding principle for the modernization of China, and listed Ecological Civilization, economic, political, social development and cultural construction as the five components of modernization. The government aims at major progress in resource saving and in constructing an environmental-friendly society by 2020 when an overall well-off society target is to be achieved. CCICED welcomes this coherent approach, which promises a more rapid and substantive shift towards a new era in the relationship between people and the environment.

CCICED members believe that balanced and green development is essential for China's scientific development and for construction of an ecological civilization. Members believe that China's green transformation is currently at a critical stage. There remain unprecedented challenges and pressures for achieving the objectives of green development. There are still prominent problems of "unbalanced, uncoordinated and unsustainable" development, with intensifying resource and environmental constraints. These issues are reflected sectorally, regionally, and even within regions.

Although China has made great efforts in the past decade to promote regional development and has achieved impressive progress, some problems and conflicts continue to intensify: large regional development gaps, especially in providing basic public services; imbalances of regional environment and economic benefit distribution, and a lack of coordination among policies related to population, economy, resources and environment. Effective coordination and cooperation mechanisms for integrated ecological system management, air and water shed pollution control are missing among regions, provinces and cities. And there is evidence of new types of environmental issues emerging, such as those related to PM_{2.5}, and concerns about

potentially unsustainable patterns of domestic consumption especially in richer parts of the country.

CCICED members have stressed the importance of addressing poverty alleviation while preserving fragile ecosystems, as a significant proportion of poor people live in these areas. There is a reliance on an extensive development mode in ecologically-fragile and lesser-developed regions, leading to potential conflicts between future environmental and development trends.

The members have concluded that, with further economic development, upgrading of industries and technologies as well as enhanced environmental protection efforts, the conflicts and constraints between resource use, economic development, and environmental protection could lessen. However, impacts from a “catching up” and “leap-frog” development mode in central and western regions with fragile ecological environments, together with a gradual transfer of polluting industries and other factors, may make the environment and development relationship more difficult.

Overall, the double pressure of environmental pollution and ecological degradation may threaten the foundation of green development in China. A key constraint is the institutional and policy-enabling environment, which today is a bottleneck for achieving balanced, and sustainable regional development. This is a key issue that the new central government must resolve.

Based on the discussions during AGM and findings of relevant studies, CCICED proposes the following five major policy recommendations to the Government of China:

RECOMMENDATION 1. Enhance institutional and policy innovation as well as enforcement in order to promote practical implementation of ecological civilization.

China’s government has recognized and committed to deepen reforms in key sectors, eliminate ideological constraints and institutional/policy flaws for scientific development, and clearly has set out some of the tasks of institutional innovation for creating an ecological civilization. It is necessary to speed up the establishment of strategies, policies, institutions and mechanisms that are compatible with an ecological civilization, and to conduct comprehensive pilot demonstrations for practical implementation. Our four detailed recommendations are to:

(1) Define and develop mid- and long-term plans for an ecological civilization at the macro level.

Based on the reform and opening-up policies of the past 30 years and the practice of scientific development in the recent decade, there should be little doubt that China can and will achieve the target of developing an overall moderately well-off society by 2020, with significant progress in resource efficiency and environmental protection. However, according to China's target to become a wealthy, democratic, civilized, harmonious and modernized country by the mid of this century, the next 30 years beyond 2020 is of particular importance. Therefore, China's government should prepare for the future by initiating study of environment and development trends and characteristics beyond 2020, and systematically designing a mid- and long-term plan identifying priority sectors and key tasks ahead. China needs long-term targets to guide near-term policies.

(2) Reform and establish institutional systems capable of creating and supporting an ecological civilization with great political commitment and drawing upon the views of the Chinese people.

Ecological civilization construction and green development are new tasks. Reform is also a complex system issue that involves various government agencies, social sectors and regions, and requires coordination of interests of various stakeholders. Ecological civilization construction must not only focus on ecosystem and environmental protection, but also put forward ecologically friendly development principles for other social sectors. Therefore:

First, a Commission for Ecological Civilization to oversee the strategy, planning and institutional setup at the top level as well as to coordinate implementation details, should be established at the central level. The Commission should ensure that ecological civilization is indeed incorporated into economic, political, cultural and social development.

Secondly, environmental protection should be the underpinning for an ecological civilization, and environmental authorities should be the leader, supporter and key practitioner in a national ecological civilization coordination mechanism. Establishment of an integrated and comprehensive environmental authority for ecological and environmental protection with integrated functions and high efficiency could be considered.

Thirdly, the relationship between central and local government should be coordinated in terms of ecological civilization construction within the framework of overall social and economic development, with authorities, administrative responsibilities and financial accountabilities clearly defined.

(3) Promote integrated institutional innovation towards the direction of green and ecological transformation.

To ensure that the concept of ecological civilization is incorporated into various aspects—and the whole process—of economic, political, cultural and social development, integrated institutional and policy innovation at various levels and within sectors is required, with greater attention to the levels of risk present in various development initiatives. The specific directions of ecological transformation of institutions and policies are:

- Politically, establish ecological civilization-oriented government performance assessments and other evaluation and accountability systems as a lever to ensure proper motivation and governance structure.
- Economically, put forward requirements on economic spatial layouts and structures. Require resource/energy efficiency and environmental performance in line with ecological and environmental principles to promote the transformation of production modes.
- Culturally, promote values and norms supporting ecological civilization and enhance awareness and action on the part of the public.
- Socially, advocate for green consumption patterns and direct social activities and promote a change of life styles compatible with an ecological civilization.
- Ecologically, put ecosystem and environmental protection as the main body of ecological civilization construction with provision of sound eco-services and products, and improve protection of biodiversity through greater attention to conservation and management of natural habitats on land, in fresh waters, and in marine areas and sensitive coastal habitats.

(4) Establish ecological civilization indicators, and encourage wider public participation

Ecological civilization development targets, indicators and approaches should be established, taking into account the differences between main function zones and regions. In addition, a government official examination and evaluation system supported by appropriate indicators should be established and an accountability system should be implemented, taking into account differences between regions and levels.

It is also important to clearly define the respective roles and responsibilities of government, enterprises and civil societies in ecological civilization. Government should play a leading role in designing, guiding and exemplifying ecological civilization. Enterprises should assume higher levels of environmental and social responsibilities and improve their environmental performance. It is also important to strengthen ecological civilization related information disclosure, promote effective and orderly public and media participation, and achieve a collective force in ecological civilization.

(5) Promote comprehensive pilot demonstrations of ecological civilization

Given the complexity and difficulty of ecological civilization construction and the regional differences, it is necessary to carry out comprehensive pilot demonstrations of elements of ecological civilization to form an overall framework for a national promotion of ecological civilization construction. Ecological civilization pilot projects should take into account regional differences.

Large numbers of pilot activities have been conducted at provincial, municipal, county, village and industrial park levels by various sectors and departments in China. It is necessary to draw on and consolidate these pilot activities, and to develop uniform standards and a specific indicator system supporting the construction of an ecological civilization.

RECOMMENDATION 2. Establish a balanced and green regional development strategy.

Balanced regional development is a difficult topic for all countries. Closing the socio-economic development gaps is one key side of the challenge, while securing sustainable development is the other. China should grasp the historical opportunities of scientific development and ecological civilization construction to meet these challenges mainly through implementation of green development.

Our detailed recommendations are to:

(1) Establish general national principles and strategy for regional development to form a broader framework of regional green development.

1) From the perspectives of its industrialization stage, urbanization level, economic capacity, and public demand for a better environment, eastern China has the basic conditions to be the first region to achieve a green transformation. In the central and western regions, conflicts between environmental and socio-economic development are still likely to be present for some time to come. Therefore, these regions must be treated as a priority for enhanced support, but in differentiated ways, in order to avoid continuation of the old path of economic development at the cost of a fragile environment. Furthermore, the effort should lead to new approaches of national, and, ultimately, international significance for sustainable development.

2) To improve the speed and quality of such a transformation, develop and implement a green strategy or blueprint for the western region, covering infrastructure construction, human capital investment, urbanization, industrialization, pollution control and eco-services provision. Increase investment for projects that can improve the human capital in western region, enhance regional infrastructure construction and eco-services provision, and reduce poverty.

3) Based on the current Main Function Zoning Plan, various development objectives, industrial development directions and spatial layout should be more clearly aligned to specific and detailed functional zoning administrative areas in order to improve operability of this zoning. At present there is confusion since the zoning is done at a coarse-grained level. For instance, develop differentiated industrial policies based on fine-grained function zones and resource carrying capacities; and develop land and population policies according to different function zones and development objectives. Then formulate investment policies according to sectoral arrangements within the detailed functional zones, and improve the fiscal system for providing public services and protecting public goods according to local ecological and social conditions. To enforce mandatory protection, define ecological red lines for important function zones, nature reserves, sensitive land and marine areas, and other ecologically fragile areas.

4) The development of eastern China heavily relies on the energy and resources supply from the western part of the country. The payment for ecological services from the east at present is far from sufficient to cover the ecological deterioration suffered

by the west. For central and western regions, establish and improve a fiscal transfer system to guide and support green transformation, and implement a payment system for ecosystem service payments from eastern areas to central and western regions.

5) Adopt the principle of “priority for resource- and energy-saving and environmental protection” in the eastern region. Develop and follow very strict environmental quality standards and related emission targets, such as imposing strict pollutant discharge standards for power intensive and high pollution industries. Enhance technological innovation and management capacities that will increase the competitiveness of green economy components and their products. Fully implement a green tax system covering environmental and resource taxes or other market-based approaches to promote behavioral change of enterprises and consumers. Increase corporate social responsibility awareness, promote green corporate governance mechanisms, and establish green enterprise alliance systems and implement green supply chain management strategies for improved voluntary measures involving business, government and end users of products and services. Seek sustainable consumption through activities such as environmental awareness raising, labeling and information sharing; strengthen public monitoring, with much improved government information disclosure and public participation concerning development decisions, and insist on more adequate public environmental information disclosure by enterprises, financial institutions and other bodies, especially those operating at municipal and provincial levels.

(2) Develop sustainable urbanization plans, and establish urbanization modes adaptive to differentiated regional characteristics.

Exploring sustainable urbanization modes is one of the major challenges for eastern, central and western regions in their process of sustainable development. Differentiated sustainable urbanization plans should be developed for each of the regions.

The eastern region should aim to develop city clusters with international competitiveness, refine the service functions of super-large and large cities, improve the urban habitat environment, promote green transformation of super-large and large cities and create green development patterns within the small and medium-sized cities, and pay much greater attention to the construction of integrated and sustainable urban infrastructure.

Central and western regions should foster eco-cities, strengthen industrial

functions of small and medium cities, enhance public service and functioning of small towns, prioritize the development of medium and small cities with advantageous locations and strong resource/environment carrying capacities, and actively tap the green development potential of current cities.

(3) Strengthen policy enforcement and establish an improved coordination and cooperation mechanism for regional green development and attainment of ecological civilization objectives.

1) China should establish a regional coordination mechanism and improve the capacity of central and western region governments, particularly county governments, to secure ecological civilization and green development. Together with direct investments from the government, a green development fund should be established to encourage green industries, improve the stability of ecosystems of regional concern, and support ecological construction projects. In the relatively developed eastern region, a regional environmental pollution control fund can be established to conduct environmental health risk assessment, provide compensation and resettlement of affected people, remediate the brown fields, and provide funding for pollution control.

2) Implement ecological compensation measures. A compensation fund should be determined according to the ecological function zoning in the eastern, central and western China. Eco-compensation standards need to be established based upon specific ecosystem service requirements. Fair compensation should be paid to rural residents that commit to long-term ecosystem protection. Meanwhile, extend the “polluter pay” principle to the resources and mineral development fields on a much more extensive and well-enforced basis.

3) Tighten the environmental access permission system to prevent pollution transfer on the part of industry migration or other development initiatives such as those related to tourism or new settlements. Implement a strict environmental access permission mechanism, adopt stricter emission standards and pollution control technology requirement to prevent new pollution sources and migration of pollution industries towards central and western regions. Develop regional environmental performance evaluation and assessment methods with enhanced public participation, define indicators, and determine the green development indicators according to main function zoning and regional characteristics. Monitor and evaluate the implementation by enterprises and local governments and enhance the enforcement. Regularly disclose the enterprise and government authorities that are not in compliance with EIA requirements.

RECOMMENDATION 3. Strengthen joint control of air pollution to improve regional air quality.

Pollution by PM_{2.5} and ozone is becoming a prominent problem that poses serious threats to public health. In recent years, the PM_{2.5} concentration in Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta remains at a high level. The haze days occur for 30-50% of a year, and there are ever widening gaps between the officially announced air quality and public perception. Regional air pollution has become an environmental problem that needs to be dealt with urgently, since no one city or even province can adequately address the issue on its own. Improving regional environmental quality requires regional joint prevention and control, coordinated control of multi-pollutants and multi-sources, institutional innovation of regional environmental management and strengthening of management capacity. Our four detailed recommendations are to:

(1) Integrate regional environmental capacity, optimize economic structure and layout, and establish new regional joint control mechanism.

1) Based on factors such as inter-city pollution transmission pattern and air quality status of cities with different environmental carrying capacities, key control areas that have significant contributions to regional air quality should be identified, especially Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta areas. These are areas where there are serious problems of regional and compound air pollution. In these areas air quality monitoring should be strengthened, and regional environmental information sharing platform, joint review/approval system for major projects, and regional emergency response mechanisms should be established. There should be strict controls on new construction projects that are likely to introduce additional air pollutants into areas where planned targets are not being achieved at present, and where air quality is seriously deteriorating. Mechanisms that can help improve regional air quality, such as emissions trading systems, should actively be promoted.

2) Deepen industrial pollution control, advance SO₂ emission reduction, establish industrial NO_x control system focusing on power and cement sectors, deepen industrial smog pollution control, and enhance VOCs pollution control from typical sectors and sources. Multiple pollution control is essential if good air quality is to be secured.

3) A systematic environmental and resource review of domestic automobile

development plan should be conducted. Comprehensively strengthen mobile sources control, implement new vehicle emission standards at proper time to reduce the vehicle emission intensity, and adopt total vehicle quantity control in cities with serious vehicle emission pollution. Develop new sustainable urban transport system. It is necessary to further define low-emission zones and zero-emission zones in the major cities under a regional air pollution control system, and develop management measures accordingly. A total vehicle volume control policy should be explored in mega cities with population of more than 10 millions. Better air quality modeling and better emission inventories are required.

4) Promote multiple high quality energy sources such as natural gas, low-sulfur diesel, LPG and electricity to replace coal. Regional coal consumption growth should be strictly controlled. There should be a continuous increase in the percentage of high-pollution fuel forbidden zones in urban built-up areas.

(2) Revise relevant laws and regulations to provide legitimate guarantees for regional air pollution control.

The existing Air Pollution Control Law cannot adequately address air pollution control under the current situation. It needs to be revised to provide legitimate support to relevant policy measures for new types of pollutants. First, PM_{2.5} and ozone should be treated as the new core need of air pollution control. Besides the further deepening of industrial pollution control, focus should also be put on pollution control of non-point sources of smog such as small and medium boilers, dust, restaurant emissions, decoration painting, small engines, as well as mobile sources such as vehicles. Also pay attention to non-vehicle mobile sources, and include emissions from ship, plane, train and off-road equipment into the coverage of air pollution control laws. Second, keep ambient air quality improvement as the key objective of air environmental management, and clarify the responsibilities and obligations of local government for the compliance of air quality. Third, strengthen the punishment of violators with a view to make non-compliance more expensive than compliance.

(3) Strengthen pollution control and implement multiple-pollutant synergic control

Establish total amount control method with improvement of air quality as core objective, implement synergic emission reduction of multiple pollutants such as SO₂, CO₂, NO_x, particulate matter and VOCs, etc., and coordinate emission reduction and energy conservation policies. Deepen industrial pollution control, advance SO₂

emission reduction, establish industrial NO_x control systems focusing on power and cement sectors, deepen industrial smog pollution control, and enhance VOCs pollution from typical sectors.

(4) Increase investment and strengthen science and technology development, and implement a strong national clean air action plan as soon as possible.

It is urgent to establish a special fund at the central government level for air pollution control, enhance the support of science and technology, and implement a national clean air action plan. Establish investment mechanism with diversified investors and modes to direct and encourage active investment from local governments and enterprises on air pollution control. Carry out special studies on generation mechanisms, source analysis and control approaches for air pollution in different regions.

RECOMMENDATION 4. Strengthen marine environmental protection and construct a more balanced approach to becoming a marine power.

While China's marine economic development is accelerating, there has been intensive pressure on the marine environment, with the most critical example being the Bohai Sea. Specifically, with increasing large-scale offshore oil exploitations, the risk of marine oil spill is rising and marine oil spill incidents occur frequently. This problem is exacerbated since there are serious problems of contaminants entering the ocean from the rivers, and also across-the-board, large-scale, rapid-paced land reclamation activities. Also other sectors are expanding, for example aquaculture and tourism, leading to conflicts in use of the marine environment. There is an urgent need to reform the current marine environmental management mechanism, coordinate marine resource development and environment protection, and achieve integrated marine-land economic development and environmental protection. In order to improve marine resource development capability, and to more effectively protect the marine ecological environment, and to approach the strategic goal of China becoming a sustainable marine economy and power, our four detailed recommendations are to:

(1) Speed up the formulation of a robust national marine development and environmental protection plan.

This plan should be based on existing land and marine function zoning plans and national-level development strategies of coastal governments, cover all the coastal zones, and identify fundamental policies and strategies for handling the relations between the marine development and marine environment protection. The plan should

integrate the overall planning of offshore areas with plans for coastal provinces, and establish marine economy and environmental protection areas in the Yellow Sea and the Bohai Sea, the East China Sea and the South China Sea.

Based on the integration of industrial distribution planning in existing land and marine functional areas, one should formulate and revise the coast layout planning of key marine industries and major sea-related industries (especially, offshore oil and natural gas, coastal nuclear power, coastal or port chemical industry, coastal or port irons and steels, coastal real estates), pay special attention to marine ecosystems that preserve high ecological value, but are highly vulnerable to human activities, and incorporate such planning into overall coastal and marine spatial plans. China should also focus on international relationships within marine development and protection, and participate and take the lead in cross-border international and regional cooperation.

(2) Strengthen legislation, law enforcement and governance mechanisms of marine environment management.

The institutional and regulation system for offshore oil field development approval and supervision should be improved with emphasis on environmental assessment as articulated in the *Environmental Impact Assessment Law* and *Regulation on Environmental Impact Assessment of Planning*. There is a need to improve the information disclosure system, establish a unified mechanism of receiving and publishing information, strengthen enforcement of the *Regulations on Open Government Information*, and ensure the public's right to know. It is important to establish and improve the cost bearing system for emergency responses, explicitly identifying the party/parties responsible for the accident and the costs of emergency responses.

The following actions should be taken. Clearly define the liability of enterprises for preparing emergency response plans. Revise relevant laws based on lessons learned from international experience—require the operator and oil company to take the primary responsibility to meet any emergency. The government's reaction to emergency should be supplemental. Develop a more complete set of applicable specifications to enterprises for access permission, operation, and for disaster response. Strengthen corporate environment awareness and responsibilities. Corporate environmental protection capacity will be considered as an essential condition for approval of enterprises' involvement in any activity by marine development. Local maritime courts and procuratorates should be instructed to clearly address enterprises'

legal responsibilities regarding pollution and damages of marine environment arising from their operation. This should discourage enterprises taking any chances. Enhance the prevention of environmental risk from marine-related enterprises, clearly regulate enterprises or other beneficiaries from overdevelopment and illegal development activities, and set in place other sector-specific mechanisms to avoid marine accidents.

Furthermore, there is a need to strengthen the enforcement and supervision capacity of the marine administration authorities, form a unified offshore law enforcement team, establish China's marine environment administrative supervision and law enforcement system, and strengthen the supervision and enforcement of the environment impact assessment system for marine development activities.

(3) Establish national marine emergency response planning system for major environmental incidents.

Based on *National Marine Functional Zoning (2011-2020)*, existing *Emergency Response Plan for Oil Spill in Offshore Oil Exploration and Development* and *Emergency Response Plan for Accidents and Disasters in Offshore Oil and Natural Gas Activities* should be consolidated, and a National Emergency Response Plan for Major Marine Environmental Incidents should be established by joint effort of relevant departments. The system should formulate special emergency response plans and on-site emergency handling plans for various levels and types of potential marine environmental accidents from all risk sources, and define the responsibilities of relevant departments and personnel for various stages of accidents (i.e., before, at the beginning of, during, and after, accidents).

(4) Strengthen the capacity building of science and technology in marine environmental management.

China should require oil and gas operators to invest in regional and national funds for marine environmental research with the aim of strengthening science and technology research on marine environmental management. This will support overall strategic planning of coastal zones and marine spaces, increase capacity for ocean and coastal emergency responses, help improve marine environmental management laws and regulations, developing marine environmental monitoring and early-warning systems, and improve marine ecological loss evaluations and remediation efforts.

RECOMMENDATION 5. Establish long-term mechanisms with environmental

quality improvement and risk prevention as objectives to promote strategic transformation of environmental management and human health protection.

It should be clearly articulated in all environmental laws, regulations, and any documents that comprise China's National Environmental Management System that the ultimate goal of the environmental system is to protect public health and the ecosystem. To achieve this goal, ambient environmental quality standards should be designed based on the scientific understanding of the pollutants' effects on human health and ecosystems and in cooperation with implementing agencies. These ambient environmental quality standards should be assessed, revised, and updated so that they are in line with the latest scientific findings. Environmental monitoring standards and regulations should be developed to accurately measure ambient conditions against the quality standards.

Our nine detailed recommendations are to:

(1) Link emissions control targets directly with achieving specific environmental goals.

A clear distinction must be made between ambient standards designed to maintain pollutant concentrations at environmentally protective levels, and national or regional pollution caps designed to limit total pollutant loadings and control trans-boundary flows. The two policies must be integrated to avoid antagonistic effects especially if market-based implementation policies are applied. Implementation policies should be established that link the interim targets and the improvement of air and water quality.

It is recommended that MEP organize comprehensive research on the environmental carrying capacity of key national development zones and preferred development zones and on the assimilative capacity of river basins. In addition, efforts should be spent in developing sectoral caps for the major industrial source sectors such as electricity, cement, iron and steel and automobile industries.

(2) Develop, maintain and update scientifically sound pollution inventories.

Inventories should be established for air and water pollution sources as well as contaminated sites and sites where chemicals and hazardous substances are located as feed stocks or products. A science-based inventory will enable China to establish criteria for prioritizing and cleaning up the worst sites.

(3) Strengthen institutional capacity at all levels.

At the central level, it is important to integrate water management authorities which are currently scattered among over 10 ministries. MEP should be designated as the lead coordinating agency, with support from the other ministries.

At the regional level, it is recommended to expand the six MEP's Regional Environmental Supervision Centers into Regional Environmental Quality Management Centers.

At the local level, governments should develop and publish mid- and long-term strategies on environmental quality and emissions reduction control, as well as a detailed implementation plan to achieve the ambient environmental standards. Sanctions should be applied in case local governments fail to meet established requirements. Meeting these targets should become the key components of the environmental performance contracts signed by the local government officials.

(4) Improve coordination between ambient air quality standards, vehicle emissions standards and fuel standards.

Continuous efforts should be made to increase incentives for low emitting vehicles and disincentives for high emitting vehicles. The air quality impacts of transportation infrastructure need to be evaluated as part of the planning and permitting process. Authority should be conferred to MEP for fuel quality standards development.

(5) Strictly enforce Environmental Impact Assessment and “Three-Simultaneous” requirements.

Environmental impact assessments (EIA) should be conducted on major government policies, and social and economic development plans. Independent analysis and verification must be carried out to ensure their scientific validity. The public should be given full access to the complete text of EIA reports and be allowed ample time for comments. The construction of projects should not begin until all EIA requirements have been satisfied and a permit issued. In addition, it is necessary to revise the existing legal requirements.

(6) Improve permitting system.

Connections must be established between permit issuance and total emissions control targets to ensure attainment of environmental quality standards. New sources

discharging pollutants covered by total emission control requirements must offset their added incremental discharges.

Enterprises should not be allowed to start up or continue to operate without pollutant discharge permits, and be supported by monitoring, reporting and inspection requirements as established by the government.

(7) Increase penalties for non-compliance and enhance monitoring and inspections.

The responsible party should pay the costs of environmental damage to people or property, or economic losses. Compensation should also cover the costs of reasonable measures taken to prevent or limit environmental damage and for clean-up and restoration of the environment to its previous state.

China must first establish stringent requirements for monitoring (including electronic monitoring), reporting and certification. This should include specific regulations governing quality control and quality assurance.

(8) Improve environmental information disclosure and public participation.

Environmental information should be made available to the public in a timely and accurate manner. Data on air quality in key cities will be disclosed in form of forecast and daily report. Online monitoring data on the quality of surface water should be disclosed every four hours. Data on section water quality in key river basins will be disclosed weekly. Lists of key projects subject to national pollution reduction mandates should be disclosed. Sensitive information such as heavy metal and landfill pollution should be published and followed up in a timely manner. Information on large environmental incidents, as well as the treatment and follow-up measures, should be released in a timely manner. Name lists of key emitters and emitters who violate laws should be disclosed.

(9) Promote the use of market mechanisms.

China needs to increase the use of market-based economic incentive tools such as taxes, emissions trading, and natural resource pricing and establish supporting policies, institutions, and guidance for each of the market-based policy alternatives under consideration. Complimentary laws and regulations and public participation must also be in place. Furthermore, setting up a Clean Production Fund will help provide incentives for existing and new enterprises to adopt clean production methods.

CCICED 2013 Work Plan

Li Ganjie, Secretary General of CCICED

Approved by Bureau Meeting

(December 12, 2012)

The year 2013 marks a new starting point in the historic development course of China. The recently completed 18th National Congress of CPC stresses that China will highlight the development of Ecological Civilization: emphasizing the concept of Ecological Civilization that respects, conforms to and protects nature; integrating the development of ecological civilization into every aspect of economic, political, cultural, and social development; and striving to build a beautiful China and achieving sustained development of the Chinese nation. The new era and new tasks bring new requirements and challenges for the work of CCICED and bring new opportunities for consolidation and further development of CCICED. After consultation with CCICED's Chief Advisors and their Expert Supporting Group, the Secretariat wishes to put forward this draft CCICED 2013 Work Plan.

I. Policy Research

1. Policy research projects relevant to the theme of the 2013 AGM—Environment and Society for Green Development

(1) Completion of two on-going Task Forces

The following two task forces were established after receiving approval at the 2011 Bureau Meeting:

- Task Force on Environmental Protection and Social Development.
- Task Force on Consumption and Green Development

The above two task forces were established and began their research in 2012. The Chinese and international experts are in the process of conducting joint policy research and are expected to present their findings and recommendations to the 2013 AGM.

(2) Commencement of three Special Policy Study Projects

In 2013, the Secretary General will, with the advice of the Chief Advisors and the Secretariat, endorse proposals on special policy study projects, case study projects and demonstration projects as necessary and at the appropriate time. The study teams will submit their reports to the CCICED 2013 AGM. The proposed policy study projects are:

- Policy on promoting social media and public participation in China's green development
- Corporate social responsibility in green development
- Promoting Urban Green Commuting.

2. Policy study (Task Force) projects starting in 2013 and reporting to the 2014 AGM

The focus of research and policy recommendations of CCICED in 2014 will be "Management and Institutional Innovation for Green Development" based on the policy requirements of the Chinese Government and the policy study framework of CCICED Phase V. The proposed task forces to be established and initiated in 2013 are discussed below:

➤ Evaluation and Prospects for a Green Transition Process

This study aims at identifying the problems, progress and stage of green transformation already reached in China during the last decade, with the intent of understanding and projecting the challenges, opportunities and goals for green transformation in the future to 2030. This information will be used to suggest a strategic framework for further promotion of green transformation and providing reference and policy bases for the implementation of the outlook on scientific development, development of *Xiaokang* society in all round way, improvement of ecological civilization development, and building a beautiful China.

➤ Additional policy studies in 2013-2014

It is recommended that the Bureau authorize the Secretary General to approve, on the recommendation of the Chief Advisors and the Secretariat, the establishment of additional task forces in 2013 on the themes of sustainable development governance

and/or the global sustainable development implications of China's economic activities overseas. In developing these policy research studies, full cognizance will be made of emerging priorities following the recent 18th CPC Congress and the first session of the 12th National People's Congress in early 2013.

3. Policy demonstration project

CCICED carried out a Special Policy Study on “Practices and Innovation of Green Market Supply Chains in China” in 2011. Its policy recommendations attracted considerable attention from relevant government departments as well as local government. It is proposed, with the support of the local governments concerned, that a Policy Demonstration (“Pilot”) Project on Green Supply Chains Trial in Tianjin and Shanghai will be carried out. The proposed project will test research findings from the 2011 Market Supply Chain SPS, thereby laying a sound foundation for scaling up and improving the workability of CCICED policy recommendations.

To maximize the value of policy demonstration projects, a procedure will be developed for identifying, designing, implementing, and monitoring other policy demonstration projects in 2013 and in future years.

II. Roundtable Meeting 2013

It is proposed that the CCICED 2013 Roundtable Meeting will be held in May of 2013. Relevant representatives from national and local governments of China, as well as Chinese and international experts and scholars, will be invited. The Roundtable Meeting aims at sharing with relevant State departments and local governments the Council’s 2012 policy research findings and policy recommendations to the Chinese Government and further extending the influence of the policy recommendations. The Roundtable will also focus on the theme of CCICED 2013 AGM, and will discuss issues in such areas as the environment, society and green development based the preliminary findings of relevant policy research that is underway, in order to lay a solid foundation for the 2013 AGM.

The meeting will be held at a location in Western China. Some CCICED Members will be invited to attend and to make presentations as necessary. The CCICED Secretariat and its International Support Office will prepare and organize the event. It is understood that, in the course of planning the Roundtable, the Roundtable mechanism will be reviewed to enhance its effectiveness in disseminating the Council's findings and recommendations and securing the implementation at the

sub-national level of policy measures flowing from Council recommendations.

III. CCICED 2013 AGM

It is suggested that the 2013 AGM be held in Beijing during the period November 13-15, 2013. The AGM will hear presentations of policy study reports and put forward policy recommendations to the Chinese Government. The proposed theme for the 2013 AGM is “Environment and Society for Green Development”. The CCICED Secretariat and its International Supporting Office will prepare and organize the AGM.

IV. Other Work

Under the leadership of the Secretary General, and with the support and coordination of the Chief Advisors and Chinese and international partners, the Secretariat will focus on the work of the following areas in addition to its other regular responsibilities.

1. Enhancing partnerships and expanding the scope of cooperation

(1) CCICED will actively develop wider partnerships and strive for increased support and contributions to the Council from a larger group countries and international organizations through flexible and diversified ways of cooperation.

(2) It will strengthen communications and cooperation with major international organizations and platforms in the fields of environment and development to share findings and successful experience.

(3) The CCICED Secretariat will strengthen communications and cooperation with relevant national departments and local governments and hold policy workshops in varying forms and at a number of levels.

(4) With the establishment of the mechanism of CCICED Strategic ‘Salon’, the CCICED Secretariat will enhance communications with experts, academicians, NGOs and business leaders in such relevant fields as the environment, economy and society.

2. Intensifying publicity and extending the influence of CCICED

The Council’s international and domestic influence will be extended through a variety of forms and channels as well as by means of a more intensive publicity effort.

(1) Developing a CCICED publicity strategy to promote the Council's findings and for extending its influence at home and abroad through improved planning and procedures.

(2) Reporting to the State Council on the Council's policy research findings at appropriate times through news briefings or other forms taking into account both international and domestic situations.

(3) Disseminating the Council's work progress and other information regularly through publications and the internet, especially through CCICED's website, www.cciced.net.

(4) Sharing the findings of CCICED more widely through participation and support of other environment and development meetings and activities at home and abroad.

3. Actively engaging stakeholders

(1) The Secretariat will strengthen communications and interaction with Chinese and international Members, provide necessary services to mobilize their initiatives for CCICED activities, and support Members' efforts to play their role to the fullest. In particular, the Secretariat will support Council Members in efforts to help frame research findings and policy recommendations and foci of special policy research projects.

(2) We will strengthen the communications and interaction with donors and partners, provide necessary information in a timely fashion, consider and act on comments and suggestions, make good use of resources, and expand and deepen cooperation.

4. Strengthening CCICED's capacity and operations

(1) We will strengthen capacity building for the Chief Advisors Supporting Experts Group, improve teamwork among Chinese and international experts and provide strong support to CCICED policy research.

(2) We will strengthen capacity building for the Secretariat. With various forms of training programs and practical workshops, we will enhance the capacity of the Secretariat staff and substantially improve the Council's routine operations, including management of policy research projects.

(3) We will strengthen the joint work mechanism between Chief Advisors and the

Secretariat and aim for more efficient and effective and high-quality design, supervision, monitoring, and guidance of policy research activities.

(4) We will implement the *Measures related to the Management of CCICED Research Projects*, (Annex 4 of the proposed CCICED Charter), strengthen management processes, and develop improved detailed rules for implementation in order to improve the quality and level of policy research of CCICED.

(5) We will explore long-term institutional arrangements for the Council.

Progress on Environment and Development Policies in China (2011-2012) and CCICED Policy Recommendations Impact

CCICED Chinese Chief Advisor & Support Team
(December 12, 2012)

INTRODUCTION

As a high-level policy advisory body approved by the Chinese Government, China Council for International Cooperation on Environment and Development (CCICED) is chiefly responsible for proposing policy recommendations and for decision makers' reference and adoption on important issues in the fields of environment and development. At CCICED annual general meetings, Chinese and foreign members engage in discussions on policy issues on the basis of policy researches, leading to policy recommendations submitted to the State Council and central government departments. The CCICED aims to further enhance its unique role, improve working mechanisms, strengthen understanding of the overall progress of policies in China, and assist members to better offer advice and suggestions. Commissioned by CCICED Secretariat, the supporting group of CCICED Chinese and Foreign Chief Consultants has been responsible since 2008 for drafting the report *Progress of Important Policies Pertaining to China's Environment and Development, and Impacts of CCICED Policy Recommendations*. This report reviews China's major progress in environment and development policies during the previous year, tracking the latest development of issues related to crucial CCICED policy recommendations, along with relevant policy recommendations adopted by Chinese government departments.

The report has two main threads. The first is to review China's major environmental and development policies introduced in the past year, and to provide CCICED foreign members with a panorama that shows the latest progress in the fields of environment and development, so as to strengthen their awareness and understanding of policy developments. The second is to compare hot issues in recent years, especially over the past year, as well as major policy recommendations on China's environmental and development policy processes, sorting out the latest concerns and adoption of policy recommendations, in order to help members understand which policy recommendations have been either referred or adopted.

Based on such understanding, CCICED members can further discuss the future direction of policy recommendations and make appropriate adjustments in order to put forward specific ones for the next year.

Currently, Chinese policy research institutions that address environment and development spring up with each passing day, with contending policy researches. Coupled with complicated policy-making processes, if a policy that tallies with CCICED policy recommendations in the past year is introduced, it may be somewhat arbitrary to view this as an impact of CCICED. This report does not attempt to assess the extent to which CCICED environmental and development policies have succeeded, but it does aim to sort out and compare China's policy practice with CCICED policy recommendations, thus illustrating the relevance of its selection of policy research topics and its proposed content with policy progress. It is perhaps up to the decision-makers to determine the real impacts of CCICED on Chinese environmental and development policies.

This paper is the fifth report provided by the supporting group of CCICED Chinese and International Chief Advisors since 2008, and is divided into two parts. The first part is a briefing and analysis of Chinese environment and development as well as the progress of relevant CCICED policy proposals made after the CCICED 2011 AGM last November. As 2011 was the last year of CCICED Phase IV, the first part also gives an overview of the influence of CCICED over the past five years. The second part provides a list of main points of the 2011 CCICED policy recommendations.

Part 1. Major Progress on Chinese Policies on Environment and Development

I. Environment and development overview

(i) New progress on environment and development during 2011

The year 2011 unveiled the curtain of the 12th “Five-Year Plan” (FYP). In the face of the complex and volatile international political and economic environment and the arduous task of domestic reform and development, the Chinese Government, centering on the accelerated transformation of economic development mode, has stepped up energy saving and emission reduction and vigorously developed the green industry and circular economy. With enhanced efforts in ecological protection, it has prioritized environmental issues of wide concern and assumed an active role in international environmental cooperation. All in all, 2011 witnessed a good start for environmental protection in the 12th FYP period.

Energy saving and emission reduction moved forward amid difficulties. In 2011, the total discharge of major pollutants continued to decline. Among them, the chemical oxygen demand (COD), ammonia, and sulfur dioxide emissions reduced to 24.999 million, 2.604 million, and 22.179 million tons respectively — a decrease of 2.04%, 1.52% and 2.21% over the previous year. However, the task remains arduous. Actual energy consumption per unit of GDP fell by only 2.01%, which was below the scheduled target of 3.5%. Total nitrogen oxide emissions rose to 24.043 million tons in 2011, an increase of 5.73% over the 2010 level. In the *2012 Government Work Report*, Premier Wen Jiabao also admitted: “There are some shortcomings and deficiencies in the government work, and we have not accomplished the target [...] in energy saving and emission reduction.” This reflects the deficiencies in the government work and the difficulties in achieving the target. As the task in the 11th FYP has been basically fulfilled, the potential for further energy conservation and emission reduction decreases substantially, increasing significantly the difficulties in achieving the target. Nevertheless, with the experience gained in the 11th FYP, it is believed that the Chinese Government will take effective measures to ensure that all targets are fully attainable.

Green development has seen significant achievement. China continues to eliminate backward production capacity. In 2011, small thermal power units with a total capacity of 3.46 million kW and steel sintering machines for 7000 m² were shut down. Moreover, outdated paper production capacity of 7.1 million tons, a printing and dyeing capacity of 2.3 billion meters, and a cement production capacity of 42

million tons were eliminated, and a number of lead-associated heavy metal enterprises were banned. Increased input in pollution control facilities further enhanced the capability in pollution control. Urban sewage treatment capacity was up by 11 million tons, and new coal-fired units with a capacity of over 50 million kW were equipped with desulphurization device. And the installed capacity of clean energy generation units reached 290 million kW — an increase of 33.56 million kW over the previous year.

Environmental supervision efforts were enhanced. In line with the unified deployment of the Central Government, MEP in conjunction with relevant departments has launched the supervision and inspection of accelerating economic transformation in 14 provinces (autonomous regions and municipalities directly under the Central Government). Rigorous environmental impact assessment was introduced. Reports were returned or the approval was rejected or suspended for 44 projects that were worth nearly RMB 250 billion and involved high-energy consumption, pollution and resource consumption, low-level redundant construction and overcapacity. Industrial pollution prevention and control upgrading and industrial restructuring were promoted. Strict environmental checks were introduced in key industries, such as the rare earth sector where the new investment in environmental protection added up to RMB 2 billion. Enterprises also face strict verification and post inspection for going public, and applicants have pooled RMB 997 million in environmental protection within the verification period and completed 916 pollution control projects.

Progress was made in the control of heavy metals and hazardous chemicals. The State Council approved the *12th Five-Year Plan for the Control and Prevention of Heavy Metal Pollution* and the *Implementation Program for Controlling the Heavy Metal Pollution in Xiangjiang River Basin*. A central allocation of RMB 25 billion was disbursed for addressing the heavy metal pollution in 26 provinces, which basically curbed the high momentum of blood lead event in lead battery enterprises. Environmental management standards for chemicals and hazardous waste were improved with the establishment of a sound, persistent statistical reporting system for organic pollutants and a standardized management, inspection and evaluation mechanism for hazardous waste. Capacities in disposing hazardous chemicals and recycling waste were also raised. License holders for hazardous substances and waste operation utilized and disposed over 9 million tons of waste and recycled up to 53 million units of waste household appliances.

Rural environmental remediation and ecological protection have been strengthened. In the aspect of rural environmental remediation, a special fund worth

RMB 8 billion was arranged by the end of 2011, benefiting 37.2906 million people. In 2011, a total area of 6.138 million hectares was restored to forests, a year-on-year increase of 3.9%, and wetland protection area was increased by 33,000 hectares. State Forestry Administration specified the woodland red line at 4.68 billion mu, which should be held like the red line for arable land. At the end of 2011, a total of 2640 nature reserves of different types and levels were established nationwide (excluding Hong Kong, Macao Special Administrative Region and Taiwan), covering about 149.71 million hectares, of which the land area amounted to 143.33 million hectares, accounting for 14.9% of the national total.

Environmental standards system was further improved. In 2011, MEP issued 73 national standards for environmental protection, including 13 national pollutant discharge standards. Among them, *Standards for Air Pollutant Emissions from Thermal Power Plants* provides important support for achieving energy saving and emission reduction goals in the 12th FYP period. *Standards for Rare Earth Industrial Pollutant Emissions* acts as a significant role in restricting the disorder in the rare earth industry and protecting the legitimate trade interests in China. *Guide for Air Quality Assessment for Passenger Vehicles* will effectively drive forward air pollution prevention and control in vehicles and the technological progress in the automotive industry. *2012 Ambient Air Quality Standards* include such indicators as particulate matters (PM_{2.5}) and ozone (O₃), and 8-hour concentration limit for stage-by-stage monitoring and implementation across the country.

(ii) Work priorities in environment and development in 2012

Environment protection priorities in 2012 were identified at the Central Economic Work Conference in December 2011, and in the Government Work Report delivered by Premier Wen Jiabao on March 5, 2012 during the National People's Congress (NPC) and Chinese People's Political Consultative Conference (CPPCC). More specifically, priority will be given to the transformation of economic development mode and economic restructuring, domestic demand expansion, independent innovation, energy saving and emission reduction.

(1) Adjust the economic structure and promote the optimization and upgrading of industrial structure. Foster and develop strategic emerging industries, emphasize the progress in major technological breakthroughs and the enhancement of core competitiveness. At the same time, prevent the blind expansion of solar energy and wind power equipment manufacturing capacity. Transform and upgrade traditional industries, enforce strict industrial policy orientation, further eliminate backward

production capacity, promote mergers and reorganizations, and drive ahead rational industrial layout.

(2) Optimize the energy structure and promote energy saving and emission reduction. Promote the efficient and clean utilization of traditional energy sources and accelerate the construction of major energy production bases and transport channels to facilitate the positive and orderly new energy development. Develop safe and efficient nuclear power, actively develop hydropower, accelerate shale gas exploration and development research, and increase the proportion of new energy and renewable energy. Give prominence to energy saving and emission reduction in key fields such as industry, transportation, construction, public institutions, residential life and in thousands of energy-consuming enterprises, and further eliminate backward production capacity. Strengthen energy management with the work program for energy consumption control, rationalize the energy price system, develop smart grid and distributed energy, implement effective management, such as energy-saving power generation and dispatch, contract energy management and government energy-efficient procurement. Conduct energy efficiency certification and labeling for supervision and inspection, vigorously develop the circular economy, and encourage saving energy, water, land and materials, and the comprehensive utilization of resources. Adopt strict target responsibility and management system, improve the assessment and evaluation mechanism and the reward and punishment system, strengthen the direction of energy conservation policies, and accelerate the establishment of an energy saving and emission reduction market mechanism.

(3) Strengthen environmental protection and highlight efforts to solve prominent livelihood-related environmental problems. Focus on the prevention and control of air, water, heavy metal, and agricultural nonpoint pollution, and address livelihood-related environmental issues such as heavy metal, drinking water source, air, soil, and marine pollution. Exert efforts to reduce agricultural pollution from nonpoint sources and implement strict supervision of hazardous chemicals. In the Beijing-Tianjin-Hebei region, the Yangtze River Delta, and Pearl River Delta, as well as municipalities directly under the Central Government and the provincial capitals, conduct PM2.5 monitoring, and expand the project to all prefecture-level cities in 2015. Promote ecological construction with the introduction of a sound ecological compensation mechanism so as to promote ecological protection and restoration. Step up grassland ecological construction through enhanced protection of natural forests, restoring forests and grassland from farmland, and restoring grassland from pasture. Drive ahead forestation and the control of decertification, rocky desertification, and sloping farmland, and provide strict protection of important ecological function zones such as

rivers, wetlands and lakes. Enhance capacity building for adapting to climate change and particularly response to extreme weather events, to improve the capability of disaster prevention and mitigation. Adhere to the principle of common but differentiated responsibility and the principle of fairness in the constructive effort in international negotiations to address climate change.

II. Environment and development blueprint for the next five years and the long term

(i) The CPC 18th National Congress gave priority to Ecological Civilization in the construction of Socialist Modernization.

In the report delivered by Mr. Hu Jintao at the 18th CPC National Congress in November 2012, he stressed the problem of resource and environmental constraints facing China in its pursuit of building socialist modernization and achieving an all-around well-off society. He pointed out that, in order to fulfill the goal of an all-around well-off society in 2020, new breakthroughs in five fields should be made: a healthy economy that grows continuously, inclusive democracy that reaches more people, a culture with increasing soft power, an overall rise of living standards, and new progress in constructing a resource-saving and environmentally-friendly society. This means that, together with economic, political, cultural, and social constructions, ecological civilization construction has become part of the concept of socialist modernization. In the report, one separate chapter is devoted to the elaboration of the construction of ecological civilization, which has never been referred to in the history of CPC reports in the past.

Mr. Hu said that promoting ecological civilization is a long-term task, and of vital importance to people's well-being and China's future. China is faced with increasing resource constraints, severe environmental pollution and a deteriorating ecosystem, and it needs to raise the ecological awareness that promotes the need to respect, accommodate and protect nature. Ecological civilization construction should be given a high priority and incorporated into every aspect and the whole process of advancing economic, political, cultural, and social progress, in order to build a beautiful country, and achieve sustainable development.

The reports depicted specific requirement for the construction of an ecological civilization:

We should remain committed to the basic state policy of conserving resources

and protecting the environment as well as to the principle of giving high priority to conserving resources, protecting the environment and promoting its natural restoration; and strive for green, circular and low-carbon development. We should integrate a spatial approach, improve industrial structure, and change production mode and life style in the interest of conserving resources and protecting the environment. We should address the root cause of ecological deterioration and reverse this trend, create a sound working and living environment for people, and contribute to global ecological security.

-Improve China's spatial development for land use. Land is the spatial carrier for ecological civilization, and we must cherish every inch of it. Guided by the principle of maintaining balance between population, resources and the environment; and promoting economic, social and ecological benefits; we should keep the pace of development under control and regulate its spatial composition. We should ensure that the space for production is used intensively and efficiently, that the living space is livable and proper in size, and that the ecological space is unspoiled and beautiful. We should leave more space for nature to achieve self-renewal. We should keep more farmland for farming, and leave to our future generations a beautiful homeland with green fields, clean water and a blue sky. We should ensure the speedy implementation of the functional zoning strategy, and require that all regions pursuing development be in strict accordance with this strategy, and advance urbanization, agricultural development and ecological security in a scientific and balanced way. We should enhance our capacity for exploiting marine resources, develop a marine economy, protect the marine ecological environment, resolutely safeguard China's maritime rights and interests, and build China into a strong maritime country.

-Promote all-around resource conservation. Resource conservation is a central component in the protection of the ecological environment. We should conserve resources and use them efficiently, and bring about a fundamental change in the way resources are utilized. We should strengthen conservation efforts, drastically reduce energy, water and land consumption per unit of GDP, and use such resources in a better and more efficient way. We should launch a revolution in energy production and consumption, impose a ceiling on total energy consumption, save energy and reduce its consumption. We should support the development of energy-efficient and low-carbon industries, new energy sources and renewable energy sources; and ensure China's energy security. We should better protect water sources, impose a cap on total water consumption, promote water recycling, and build a water-conserving society. We should ensure that the red line for protecting farmland is not crossed and strictly control land uses. We should strengthen exploration, protection and proper

exploitation of mineral resources. We should develop a circular economy to reduce waste and resource consumption, reuse resources and recycle waste in the process of production, distribution and consumption.

-Intensify the protection of ecosystem and environment. A sound ecological environment is the fundamental basis for sustainable human and social development. We should launch major projects for restoring the ecosystem, increase our capacity for producing ecological products, take integrated steps to control desertification, rocky desertification and soil erosion, increase forests, lakes and wetlands areas; and protect biodiversity. We should accelerate the construction of water conservancy projects, and enhance our capacity for responding to floods, drought and waterlogging in urban and rural areas. We should improve the system for preventing and mitigating natural disasters, and become better able to respond to meteorological, geological and seismic disasters. We should take a holistic approach to intensifying prevention and control of water, air and soil pollution, putting prevention first and placing emphasis on serious environmental problems that pose health hazards to people. We will work with the international community to actively respond to global climate change on the basis of equity and in accordance with the principle of common but differentiated responsibilities and respective capabilities of all countries.

-Enhance system building to promote ecological civilization. System building is crucial to protecting the ecological environment. Resource consumption, environmental damage and ecological benefits should be integrated into the system for evaluating economic and social development; and related goals, evaluation methods and reward and punishment mechanisms should be adopted in keeping with the need for promoting ecological civilization. We should establish a system for developing and protecting China's spatial development and improve the system for providing the strictest possible protection for farmland, for managing water resources and for protecting the environment. We should deepen reform of prices, taxes and fees for resource products, and establish a system for resource consumption and compensation for ecological damage - a system that responds to market supply and demand, and resource scarcity; recognizes ecological values and requires compensation in the interests of future generations. We should carry out trials for trading energy savings, carbon emission rights, pollution discharge rights and water rights. We should strengthen environmental monitoring and improve the system of accountability for ecological and environmental protection, and the system of compensation for environmental damage. We should increase publicity of and education in ecological civilization, raise public awareness of the need to conserve resources, protect the environment and promote ecological civilization, and foster a

social atmosphere for practicing moderate consumption and cherishing the ecological environment.

(ii) “Protection along with development and development accompanied by protection” identified in the 7th National Conference on Environmental Protection

After the first Conference on the Human Environment in Stockholm, the Chinese Government held the first National Conference on Environmental Protection in 1973, established its environmental protection policy, and developed *Opinions on Environmental Protection and Improvement*. This conference opens up the cause of environmental protection in China and has had a profound impact on the after environmental protection. The second National Conference on Environmental Protection held in 1983 identified environmental protection the basic national policy, and rolled out the major policies of “prevention first and prevention in combination with control”, “polluter responsible for pollution control” and “strengthened environmental management”. In the next 30 years, the National Conference on Environmental Protection was held every four to seven years to sum up national efforts and develop the principles and policies for future work. Each session of the National Conference on Environmental Protection has been a landmark in the cause of environmental protection in China and a milestone for efforts in different stages.

The 7th National Conference on Environmental Protection was held in Beijing on December 20-21, 2011. Vice Premier Li Keqiang attended the conference and delivered an important speech. The conference summed up the achievements in the past five years, which laid a sound foundation for the work in the new era. (1) Significant transition from awareness to practice in environmental protection. Environmental protection plays a more significant role in the comprehensive, coordinated, and sustainable economic and social development, while the market mechanism acts a more apparent role in environmental protection. *Law on the Promotion of Circular Economy*, *Law on the Prevention and Control of Water Pollution*, and *Regulations on the Planning Environmental Impact Assessment* have been formulated or amended, consolidating the legal basis for environmental protection. (2) Obvious increased investment and enhanced capacity-building efforts in environmental protection. Increased central and local financial funds have backed up the advances in environmental infrastructure, scientific research, personnel training and international cooperation. (3) Gradual effects of environmental protection in

economic development optimization. Under the guidance of the “three changes”¹, environmental protection has played an important role in promoting industrial restructuring and economic development transformation. (4) Remarkable results in pollution prevention and control and reduced emissions of major pollutants. Emission reduction targets were fully completed beyond, and environmental quality has improved in some areas. A rural population of 215 million was free from unsafe drinking water problems, the national urban sewage treatment rate was up from 52% to 77%, and the proportion of thermal power desulphurization units up from 14% to 86%. In this sense, the environmental quality task was completed for the Beijing Olympic Games and Shanghai World Expo.

Vice Premier Li Keqiang said in the conference that China is still and will be for a long time in the primary stage of socialism. In light of the prominent underdevelopment problems, development is still the top priority in China. At the same time, China is also facing imbalanced, uncoordinated, and unsustainable development, and the environment has become a prominent hindrance to further development. Therefore, transformation is a must for people-oriented, comprehensive, coordinated and sustainable development, and ecological and environmental protection should be enhanced for scientific development. Transformation is another form of development in which environmental protection will help foster new growth fields and improve the quality and efficiency of development. Vice Premier Li Keqiang called for properly handling the relationship between economic development, innovational transformation, and environmental protection and conservation. In other words, environmental protection should be carried out along with the development, and the development is pursued on the premise of environmental protection. We strive for reform and innovation in the various aspects of environmental protection in the active exploration of a new, cost-effective, low-emission, and sustainable environmental protection path to achieve the multi-win-win in economic, social, resource, and environmental benefits, and to promote stable and rapid long-term economic development and social harmony and progress.

In terms of reform and innovation in future environmental protection efforts,

¹ It refers to the change from emphasizing economic growth but ignoring environmental protection to emphasizing both economic growth and environmental protection; the change from environmental protection lagging behind economic development to environmental protection in synchronization with economic development; and the change in environmental solutions from administrative measures to the comprehensive use of legal, economic, technical and necessary administrative measures.

Vice Premier Li Keqiang came up with six requirements. (1) Implemented objectives and responsibilities. Develop an index system for ecological civilization construction objectives and incorporate the objectives in the performance evaluation of local governments. Leadership that fails to accomplish the objectives is investigated for responsibilities. (2) Improved economic policies. Policies for denitration power price and urban sewage treatment charges should be improved. Incentives remain to promote pollution control and serve as subsidies in rural comprehensive environmental control, and environmental taxes will be levied. (3) Promoted reform and innovation. Exploration is made to implement emissions trading, ecological compensation, and the ladder pricing for resources. (4) Strengthened environmental law enforcement. Amendments to the Law of Environmental Protection should be advanced to increase the penalties for violations and enhance deterrent. A sound environmental damage compensation mechanism should be established to encourage environmental public interest litigation and legal aid and strengthen environmental justice safeguard. (5) Enhanced scientific and technological support. Efforts should be expedited for major environmental projects, such as the control and treatment of water pollution, regional comprehensive prevention and control of air pollution, soil pollution remediation and control, and integrated prevention and control of heavy metals. (6) Participation of all citizens. Channels of public participation in environmental protection should be smoothed so that their voices are fully heard in the environmental planning, decision-making and projects involving public interests. It is encouraged to report and expose environmental violations and consciously accept social supervision.

In addition, MEP minister Zhou Shengxian, entrusted by the State Council, signed the target responsibility documents for pollution reduction in the 12th FYP period with provinces (autonomous regions and municipalities), Xinjiang Production and Construction Corps, and responsible persons of the central enterprises. It marks that the emission reduction task has been decomposed and allocated to local governments and enterprise groups for implementation.

(iii) New environmental protection blueprint depicted in the 12th Five-Year Plan for Environmental Protection

The 12th Five-Year Plan for National Environmental Protection issued by the State Council on December 20, 2011 (hereinafter referred to in this topic as the Plan), in accordance with the crucial historical stage of building a moderately prosperous society, highlights green transformation to boost the economic development rather than the solo environmental protection. It also emphasizes the management of total

volume, quality, security, and service in environmental protection rather than the independent pollution prevention and control. Environmental management shall cover all fields and the whole progress, not limited to dominant production fields. The Plan designs the overall environmental efforts in the next five years and clarifies the direction of future work in the next five years or an even longer time.

The Plan prioritizes pollutant reduction, risk control, capacity building, and infrastructure, and specifies seven objectives: significantly reduced emissions of major pollutants; effective environmental protection of urban and rural drinking water sources with substantial improvement in water quality; effectively curbed heavy metal pollution, and remarkable results in the prevention and control of persistent organic pollutants, hazardous chemicals, and hazardous waste; impressive enhancement in urban environmental infrastructure construction and operation; reversed momentum in ecological environmental deterioration; significantly increased regulatory capacity and further raised level of nuclear and radiation safety; and establishment of a sound environmental regulatory system.

The Plan also identifies seven indicators for total emissions and environmental quality to control water and air pollution (listed in the box 1). These indicators cover a larger scope and introduce more stringent criteria compared with those in the 11th FYP. Ammonia and nitrogen oxides are added in the binding targets, and the number of national monitoring points for surface water environment quality control is increased from 759 to 970, with the evaluation factors up from 9 to 21. The implementation scope of atmospheric environmental quality indicators is also expanded from 113 major environmental protection cities to more than 333 prefecture-level cities, and more strict evaluation criteria is adopted.

Box 1: Major environmental indicators in the 12th FYP period

No.	Indicators	2010	2015	Growth in 2015 over 2010
1	COD (10,000 tons)	2551.7	2347.6	-8%
2	Ammonia nitrogen (10,000 tons)	264.4	238.0	-10%
3	SO ₂ (10,000 tons)	2267.8	2086.4	-8%
4	NO _x (10,000 tons)	2273.6	2046.2	-10%
5	Proportion of Grade V surface water in state-controlled sections (%)	17.7	<15	-2.7 percentage points
	Proportion of Grade I and II water in the state-controlled sections of seven major river systems (%)	55	>60	5 percentage points
6	Proportion of cities at the prefecture level or	72	≥80	8 percentage points

	above with Grade II or better air quality (%)			
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Priorities identified are total emission reduction, quality improvement, risk prevention, and balanced development.

(1) Design differentiated strategies for pollutant control in different fields, industries, products, and regions. Major features of the strategies include: a) expanding the range and field of pollutant control from industrial and domestic sources to industrial, domestic, agriculture and traffic sources; b) emphasize the source control and process control, stepping up the elimination of backward capacity and reasonable regulation of total energy consumption, and exploring the regulation of the total urban vehicles; and c) highlighting regional characteristics with improved regional control requirements. Total nitrogen or total phosphorus discharge should be controlled in coastal areas prone to red tide, such as eutrophicated lakes and reservoirs, the East China Sea, and the Bohai Sea, while heavy metals are brought under control in key areas for the comprehensive prevention and control of heavy metal pollution.

In the industrial sector, industrial total pollutant control is implemented. Requirements are specified for such major industries as paper making, printing and dyeing, chemical, electric power, iron and steel, and cement, in order to control the total discharge of COD and ammonia in paper making, printing and dyeing, and chemical industries and SO₂ emissions in the iron and steel industry. An evaluation system is introduced to assess the pollutant intensity per unit product. To control emissions resulting from economic development, efforts should be made to strengthen the adjustment of energy structure and develop environmental protection and energy saving strategically emerging industries, and to carry out the pilot to control coal consumption in major areas for joint atmospheric pollution prevention and control. In the aspect of domestic sources, the urban sewage treatment rate should reach 85%. In the aspect of agricultural sources, large-scale livestock production shall be brought under enhanced pollution control. By 2015, more than 50% of national large-scale livestock farms and communities should be equipped with supporting solid waste and sewage storage and treatment facilities. In the field of traffic, vehicle green flag management and fuel quality should be improved. New clean fuel and the nationwide supply of motor vehicle fuels in line with national standards IV are encouraged. In addition, urban public transport should be actively boosted.

(2) Improve environmental quality to earnestly solve outstanding environmental problems, such as unsafe drinking water and air and soil pollution, which bring serious damage to the health of the masses. Strengthen the comprehensive control,

ecological protection and supervision to significantly improve the ecological environment quality.

Through water environment protection, drinking water sources are brought under strict protection, with complete protection zone delineation. Comprehensive efforts should be made to prevent and control marine environmental pollution and ecological damage, and the overall water quality of coastal waters shall remain stable in 2015. Groundwater pollution prevention and control are driven ahead, with exploration made in pilot restoration.

Through air pollution control, multiple pollutants are included for comprehensive prevention and control, involving the progressive ozone and PM_{2.5} monitoring and strict control of PM, volatile organic compounds, and toxic emissions. A sound joint prevention and control mechanism for atmospheric pollution should be established to improve joint law enforcement and inspection. Acid rain, smog and photochemical smog should also be significantly reduced.

Through soil environmental protection, the soil environmental protection system and supervision of soil environment are enhanced, and measures and technical specifications for agricultural origin soil environmental protection supervision and management are developed. Efforts should be made to study and set up the soil environmental quality assessment and filing system for construction projects, and the contaminated soil survey, assessment and repair system, and clarify entities' responsibility and requirements for soil environment governance. The pilot and demonstration for contaminated sites and soil pollution control and remediation need to be launched. Site environmental risk assessment will be included in the EIA for construction projects. Contaminated sites without assessment and sound governance are prohibited from land transfer, development, and utilization, and contaminated sites that are assessed to have a serious impact on human health shall be subject to control measures and not be used for residential development.

In ecological protection and regulatory aspects, it is necessary to strengthen the protection and development of national key ecological function zones, as well as natural reserves development and supervision, biodiversity conservation, resource development and ecological environment monitoring. In 2015, the land area of nature reserves shall stably account for 15% of the national area, and 90% of the national key protected species and typical ecosystems shall be under protection. In addition, the mine environmental control and ecological restoration margin system will be implemented.

(3) Enhance the prevention and control of environmental risks in key fields. Environmental risk prevention and control has been proposed for the first time in the Plan. Nuclear radiation, heavy metals, hazardous waste, persistent organic pollutants, and hazardous chemicals are identified as the priorities in the prevention focus of environmental risks. The risk management system should be improved, while the mechanism for handling environmental accidents and damages compensation and recovery should be established.

(4) Improve the basic public service system associated with the environment, and promote regional and urban balanced development. Also for the first time, the Plan puts forward the environment as a public good, and includes the basic environmental public service into the scope of public service equalization, which focuses on the building of environmental infrastructure and environmental regulatory capacity. Specify the appropriate scope and standards of basic environmental public service, strengthen urban, rural and regional coordination, and improve the dedicated basic public service system. By means of general transfer payments and ecological compensation measures, the Central Government plans to increase the support to the western region — areas prohibited and restricted from development — and areas with special difficulties, and raise the supply level of basic public services in environmental protection. Efforts are made to boost the inter-regional coordinated development in environmental protection, raise the level of environmental protection in rural areas, strengthen environmental regulatory capacity, and thereby narrow the gap in sewage treatment, garbage processing, environmental monitoring and assessment capabilities between regions, urban and rural areas, and different groups of people. Effective measures are taken to ensure the safety of drinking water sources in urban and rural areas. In this way, all citizens, regardless of geographic, ethnic, gender, income and status differences, can receive basic public services in environmental protection that are compatible with the level of economic and social development and roughly equal in final results.

(iv) New roadmap outlined in the *12th Five-Year Plan for Energy Saving and Emission Reduction*

On August 6, 2012, the State Council issued the *12th Five-Year Plan for Energy Saving and Emission Reduction* (referred to as the Plan under this topic), which sums up the achievements during the 11th FYP period, analyzes the basis of efforts and challenges in the 12th FYP period, and sets the overall goal and objectives with specific tasks and measures.

In the 11th FYP period, remarkable results were achieved in energy saving and emission reduction. Average annual energy consumption increased at a rate of 6.6%, supporting the average growth rate of 11.2% in GDP. And the energy consumption per unit of GDP decreased by 19.1%, which is equivalent to 630 million tons of standard coal, and contributes to a reduction of 1.46 billion tons in CO₂ emissions. The level of energy efficiency also increased significantly. Coal consumption for thermal power plants dropped by 10% from 370 g/kWh in 2005 to 333 g/kWh in 2010. Coal consumption per ton steel produced went down by 12.1% from 688 g/kWh to 605 g/kWh. Comprehensive energy consumption of cement, ethylene, and synthetic ammonia production fell by 12.1%, 28.6%, and 11.3% respectively. However, China also faces a series of problems represented by the slow process in industrial restructuring. In the 11th FYP period, the proportion of added value of the tertiary industry in GDP was less than the expected target, while the heavy industrial output value accounted for 70.9%, up from 68.1%, of the total in the industrial sector. Industries with high energy consumption and high emission developed too quickly, undermining the realization of structural energy efficiency targets. In general, energy efficiency was low. China contributed 8.6% to the world's GDP, but used 19.3% of the world's energy, so its energy consumption per unit of GDP was still more than 2 times the world average.

In 2015, it is the aim to reduce the national energy consumption per RMB 10000 of GDP to 0.869 tons of standard coal (at 2005 prices), down by 16% from the 1.034 tons in 2010, (down by 32% from the 1.276 tons in 2005). In the 12th FYP period, China plans to achieve energy savings of 670 million tons of standard coal. Specific targets are listed as follows:

Box 2: Major indicators for energy saving in the 12th FYP period

Indicators	Unit	2010	2015	Change/change rate
Industrial sector				
Energy consumption per unit of industrial added value (of enterprises above the designated size)	%			[-21% or so]
Coal consumption in thermal power plants	gce/kWh	333	325	-8
Power consumption	%	6.33	6.2	-0.13

rate in thermal power plants				
Comprehensive line loss rate of grid	%	6.53	6.3	-0.23
Comprehensive energy consumption per ton of iron production	Kg Ce	605	580	-25
Comprehensive AC power consumption for aluminum ingots production	kWh/t	14013	13300	-713
Copper smelting energy consumption	Kg/t Ce	350	300	-50
Comprehensive energy consumption for crude oil processing	Kg/t Ce	99	86	-13
Comprehensive energy consumption for ethylene production	Kg/t Ce	886	857	-29
Comprehensive energy consumption for synthetic ammonia production	Kg/t Ce	1402	1350	-52
Comprehensive energy consumption for caustic soda (ion-exchange membrane) production	Kg/t Ce	351	330	-21
Comprehensive energy consumption for cement clinker production	Kg/t Ce	115	112	-3
Comprehensive energy consumption for flat glass production	Kg/weight box Ce	17	15	-2
Comprehensive energy consumption for paper and paperboard production	Kg/t Ce	680	530	-150
Comprehensive energy	Kg/t Ce	450	370	-80

consumption for pulp production				
Comprehensive energy consumption for household ceramics production	Kg/t Ce	1190	1110	-80
Building				
Area of renovated existing residential buildings in northern heating regions	100Mil m ³	1.8	5.8	4
Compliance rate of newly created urban green buildings	%	1	15	14
Transportation				
Comprehensive energy consumption for railway transportation	ton/100Mil ton-km Ce	5.01	4.76	[-5%]
Comprehensive energy consumption for vehicle operation per week	Kg/100 ton-km Ce	7.9	7.5	[-5%]
Comprehensive energy consumption for ship operation per week	Kg/kiloton-km Ce	6.99	6.29	[-10%]
Comprehensive energy consumption for civil aviation operation per week	Kg/ton-km Ce	0.450	0.428	[-5%]
Public institutions				
Energy consumption per unit of construction area	Kg/m ² Ce	23.9	21	[-12%]
Energy consumption per capita	Kg/person Ce	447.4	380	[15%]
Energy efficiency of end-use equipment				
Coal-fired industrial	%	65	70-75	5-10

boilers (in operation)				
Three-phase asynchronous motors (design)	%	90	92-94	2-4
Input specific power of volumetric air compressors	kW/(m ³ ·min ⁻¹)	10.7	8.5-9.3	-1.4 – -2.2
Losses of power transformers	kW	Load:43 No-load:170	Load:30-33 No-load:151-153	-10 – -13 -17 – -19
Average fuel consumption for vehicles (passenger cars)	liters/100 km	8	6.9	-1.1
Room air conditioners (energy efficiency rate)	–	3.3	3.5-4.5	0.2 – 1.2
Refrigerators (energy efficient rate)	%	49	40-46	-3 – -9
Domestic gas water heaters (thermal efficiency rate)	%	87-90	93-97	3 – 10

Note: Figures in [] indicate the change rate.

Box 3: Major indicators for emission reduction in the 12th FYP period

Indicators	Unit	2010	2015	Change/change rate
Industrial sector				
Industrial COD	10000 tons	355	319	[-10%]
Industrial SO ₂	10000 tons	2073	1866	[-10%]
Industrial ammonia nitrogen	10000 tons	28.5	24.2	[-15%]
Industrial NO _x	10000 tons	1637	1391	[-15%]
SO ₂ in the thermal power industry	10000 tons	956	800	[-16%]
NO _x	10000 tons	1055	750	[-29%]
SO ₂ in the iron and steel industry	10000 tons	248	180	[-27%]
NO _x in the cement industry	10000 tons	170	150	[-12%]
COD in the paper making	10000 tons	72	64.8	[-10%]

industry				
Ammonia nitrogen in the paper making industry	10000 tons	2.14	1.93	[-10%]
COD in the textile and printing industry	10000 tons	29.9	26.9	[-10%]
Ammonia nitrogen in the textile and printing industry	10000 tons	1.99	1.75	[-12%]
Agriculture				
COD	10000 tons	1204	1108	[-8%]
Ammonia nitrogen	10000 tons	82.9	74.6	[-10%]
Cities				
Urban sewage treatment rate	%	77	85	8

Note: Figures in [] indicate the change rate.

To achieve these goals, the Plan puts forward the major tasks in optimizing the industrial structure, improving energy efficiency and reducing major pollutants.

Optimize the industrial structure. 1) Limit the excessive growth of energy-consuming and emitting industries, raise the access threshold in energy efficiency, environmental protection, land and security for such industries, and restrict the export of resource-based products with high energy consumption and emissions. Optimize the regional spatial distribution of major industries such as electric power, iron and steel, cement, glass, ceramics, and paper making, and prevent their transfer to central and western China. 2) Eliminate the backward production capacity. Strictly implement the *Industrial Restructuring Guidance Catalogue (2011)* and *Catalogue for Backward Production Process, Equipment, and Products to Be Phased Out (2010)*, for some industries; encourage regions to develop more stringent energy consumption and emission standards; and step up efforts to phase out backward production capacity. 3) Promote traditional industrial upgrading. Optimize high technologies and advanced applicable technologies to upgrade traditional industries. Enhance product performance in energy efficiency and environmental protection, and build green low-carbon brands. 4) Adjust the structure of energy consumption. Actively develop hydropower, and orderly develop nuclear power on the basis of safety. Accelerate the commercialization of clean energy such as wind, solar, geothermal, biomass power, and coal bed methane, expedite the development of distributed energy resources, improve the grid capacity in installing fossil energy sources and clean energy

generation. In 2015, non-fossil energy consumption will account for 11.4% of the total primary energy consumption. 5) Promote the development of the services sector and strategic emerging industries. In 2015, the share of the added value of the service industry in GDP will increase by four percentage points over the 2010 level, while that of strategic emerging industries will reach approximately 8%.

Promote energy efficiency. 1) Raise energy efficiency in the industrial sector, especially in power, coal, iron and steel, building materials, petroleum and petrochemicals, chemicals, and non-ferrous metals industries. 2) Improve building energy efficiency comprehensively, covering planning, regulations, technologies, standards, and design. Newly created urban buildings shall meet 100% of the energy efficiency standards in the stage of design. Improve the renovation of existing buildings, especially the large-scale residential and public buildings. 3) Promote transportation energy efficiency. Accelerate the formation of a convenient, safe, and efficient transportation system, constantly optimize the transport structure, and further enhance the energy efficiency of transportation means through technological and management innovation. 4) Promote energy efficiency in agriculture and rural areas. Conduct energy efficient renovation in agricultural machinery, rural housing, irrigation, and stoves, and boost the development and comprehensive utilization of small hydro, wind, solar power and straw. 5) Enhance energy conservation in commercial and civil use. Carry out energy audits, encourage consumers to buy energy-efficient and eco-friendly vehicles and energy-efficient housing, promote energy-efficient household appliances, office equipment and lighting products. 6) Implement energy saving in public institutions. Improve the energy management statistical monitoring evaluation and training system of public institutions.

Escalate the reduction of major pollutants. Strengthen the construction of urban sewage treatment facilities and reduction of pollutants in major industries. Prevent and control the pollution from agricultural sources, control vehicle emissions, and drive ahead PM2.5 control.

III. Important progress in environmental and developmental policies related to CCICED policy recommendations

The *12th Five-Year Plan for National Economic and Social Development* specifies that the theme in the next five years is scientific development, and the main task is the transformation of economic development mode. In 2011, the first year of the 12th FYP period, CCICED identified the theme of its annual conference as the “green transformation of economic development mode”, in affirming the theme and

main task of the Chinese Government. It explicitly demonstrates that green transformation is the direction and the important content of the transformation of economic development mode, but also the global trend. Green transformation offers an accurate positioning of China in the worldwide green competition within the next 20 years, and China will create social welfare and wealth by virtue of green transformation. On the 7th National Conference on Environmental Protection, Chinese Vice Premier Li Keqiang elaborated the relationship between development and transformation. “Transformation is a must for people-oriented, comprehensive, coordinated and sustainable development. Ecological and environmental protection should be enhanced to achieve scientific development. Transformation is optimized development with promotion and control, in which environmental protection can help foster new growth areas and improve the quality and efficiency of development. In nature, environmental problems are associated with development mode, economic structure and consumption patterns. For a fundamental solution to environmental problems, it is necessary to exert efforts on transformational development, economic restructuring, and consumption patterns.” His thought about the significance and direction of transformation is completely consistent with the concept of CCICED’s green transformation.

Centering on the “green transformation”, CCICED set up three task forces responsible for innovative green economic development mechanisms and policies, low-carbon path of industrialization, and investment-and-trade-driven green development. It then made specific policy recommendations to the Chinese Government in 2011 based on the research about green supply chain, mercury pollution and policies for prevention and control. These policy recommendations were either adopted by the Chinese Government, or became important policy and social issues last year.

(i) Continue green transformation for economic development

According to CCICED in the policy recommendations raised in 2011, green economy is an economic development model based on environmental protection and sustainable utilization, and includes low-carbon economy and circular economy. It integrates such core concepts as high resource efficiency, low pollution, low carbon, and balanced social development, plus the many opportunities associated with innovation. For this reason, it should become the most vibrant, promising and inclusive model of economic development. China’s experience shows that the essence is to harmonize the relationship between economic growth and environmental protection, which needs to be balanced, coordinated and mutually supportive. Green

economic development is the core driver and important approach through which green transformation can be achieved. To this end, CCICED recommends building a green economic development system to comprehensively drive the green transformation of economic development mode.

1. Industrial restructure enhancing green transform

CCICED also called for appropriate strategic objectives and framework for green economic development and green transformation. Efforts should be made in industrial, agricultural and service sectors to achieve industrial restructuring and accelerate transformation to labor-intensive and technology-intensive economy. In the industrial sector, the green transformation should also be expanded to traditional industries to advance the sustainable use of energy and resources, build a clean, stable, safe, diversified energy industrial system, direct and regulate surplus energy utilization in energy-consuming industries, and thereby achieve collaborative control in energy saving and emission reduction.

China has introduced a series of new initiatives on strategic emerging industries associated with new energy, energy saving and environmental protection, and circular economic development during the 12th FYP period to promote green economic development.

Energy saving and environmental protection industries have developed. In the annual policy recommendations, CCICED put forward increased support for strategic emerging industries and further relaxation of their access conditions, as well as the advance in formation and implementation of the development plans of the seven strategic emerging industries. In June 2012, the State Council issued the *Development Plan for Energy Saving and Environmental Protection Industry in the 12th Five-Year Plan Period*, and identified the four objectives. (1) The industrial output value in energy saving and environmental protection rises more than 15% annually on average, and will reach RMB 4.5 trillion in 2015. Such increase accounts for about 2% of the GDP. (2) Great improvement will be made in the quality and performance of energy-efficient and eco-friendly equipment and products in 2015. China will have a group of independent intellectual property rights and international brands, as well as energy-efficient and eco-friendly equipment and products with core competitiveness. Part of the major common technologies will reach the international advanced level. (3) The market share of energy-efficient products will increase from the current 10% to more than 30% in 2015, and that of products for resource recycling and eco-friendly products will also see a substantial rise. (4) Efforts shall be made to develop energy

saving and environmental protection services. Sales of energy services using contract energy management mechanism will increase at an annual rate of 30%, and in 2015, specialized contract energy management and environmental services companies with an annual output value of RMB 1 billion each are expected to number 20 and 50 respectively. Urban sewage, garbage, and desulfurization, denitration facilities are put into specialized, market-oriented operation.

Resource recycling and utilization goals are developed. In December 2011, NDRC rolled out the Guidance for the Comprehensive Utilization of Resources, and the Implementation Plan for the Comprehensive Utilization of Bulk Solid Waste. It plans to raise the recovery rate of mineral resources and the comprehensive utilization rate of common associated minerals to 40% and 45% respectively, the comprehensive utilization rate of bulk solid waste up and industrial solid waste to 50% and 72% respectively, and the recycling utilization rate of major renewable resources to 70%. The total output of recycled copper, aluminum and lead is aimed to account for 40%, 30%, and 40% respectively, and the comprehensive utilization of crop straw is expected to exceed 80%. It also calls for further improvement of the policies and measures for the comprehensive utilization of resource; significantly raise the level of technical equipment; universally enhance the corporate competitiveness in comprehensive utilization; gradually expand the market share of products; and form the long-term mechanism for industrial development. In April 2012, the General Office of the State Council issued the *Labor Program for Priority Work in Establishing a Complete, Advanced Goods and Waste Recycling System*. In June 2012, NDRC, MEP, MOST and MIIT jointly released the *National Catalogue for Encouraged Technologies, Processes and Equipment for Circular Economic Development (First Batch)*.

Investment in new energy development is opened up. In June 2012, NEA issued the *Implementation Opinions on Encouraging and Guiding Private Capital Investment Expansion in the Field of Energy*, which continues to support the comprehensive access of private capital investment to new energy and renewable energy industries; encourages private capital to expand the investment in wind, solar, geothermal biomass sectors; develop energy storage technologies, materials and equipment; participate in developing energy supply facilities for new energy vehicles; and the building of new energy vehicles demonstration cities, green energy demonstration counties, and solar energy demonstration villages.

New energy demonstration in cities and industrial parks are promoted. In May 2012, NEA issued the *Notice on Applying for New Energy Demonstration Cities and*

Industrial Parks. New energy demonstration city construction involves promoting the application of various types of renewable energy sources and technologies, with the focus on solar thermal utilization, distributed solar photovoltaic system, distributed wind power generation, biomass clean fuel, utilization of urban solid waste, geothermal energy, surface water and air heat utilization, and new energy powered transportation. Efforts were made to drive the technological progress in new energy utilization, and establish a management system and policy mechanism adaptive to new energy development.

In addition to national planning, policies and standard measures, some places also introduced the relevant laws and regulations to promote clean energy, renewable energy and circular economic development last year. Gansu and Shanxi developed the *Regulations for Promoting Circular Economic Development*, Zhejiang developed the *Regulations for Promoting the Development and Utilization of Renewable Resources*, and Datong developed the *Regulations for the Recycling and Management of Renewable Resources*.

2. Energy saving and emission reduction forcing the transformation of economic development mode

Experience in the 11th FYP shows that energy saving and emission reduction has acted as an important role in promoting green economic transformation in China. Energy conservation and emission reduction become hard grasps and boosters in the transformation of economic development mode. China's targets and policy measures in this regard are consistent with the international concept of "green growth" and "green development".

In 2011, energy saving and emission reduction targets were decomposed to local governments and major polluters, marking the implementation of the target responsibility. As the 12th FYP for energy saving and emission reduction was unveiled, a new round of work kicked off. Some local governments have also developed local laws or regulations to add fuel to the efforts. For example, Tianjin, Kunming and the Shantou Special Economic Zone developed the respective *Energy Conservation Regulations*, while Tianjin, Inner Mongolia Autonomous Region, and Xinjiang Uygur Autonomous Region rolled out measures for energy management in public institutions.

CCICED put forward "boosting sustainable consumption" in the policy recommendations raised in 2011, adding that it needs to change people's behavior and

lifestyle and government, business, and public participation. Governments should guide and demonstrate green consumption through green procurement, energy saving and emission reduction in itself. And the public shall become aware of sustainable consumption and put it into daily practice, such as saving water and reducing domestic garbage. Enterprises should establish a green supply chain. Such universal participation for green transformation was initially exposed in 2011, the first year of the 12th FYP period.

A nationwide campaign on energy saving and emission reduction was launched. In the 11th FYP period, the efforts commenced at the enterprise level. To fully mobilize the enthusiasm of the whole society, the *National Action Program* was rolled out in February 2012 by NDRC, Publicity Department of the CCP Central Committee, MOE, MOST, MOA, Government Offices Administration, All China Federation of Trade Unions, Central Committee of Communist Youth League, All China Women's Federation, China Association for Science and Technology, the PLA General Logistics Department, General Office of the NPC Standing Committee, General Office of the CPPCC Committee, MOF, MEP, SASAC, and Administration of Offices Directly Under the CCP Central Committee. Ten special projects that involve communities, young people, businesses, schools, barracks, rural areas, government agencies, science and technology, science popularization, and the media were launched in the form of typical demonstration, special events, exhibitions, job creation, and rationalization proposals. This has been done to extensively mobilize the whole society in energy saving and emission reduction, and advocate civilized, energy-efficient, green, low-carbon production and consumption patterns and habits. Ministries under the Central Government have also issued notices to step up efforts in respective sectors. For example, MOA released *Opinions on Further Strengthening Energy Saving and Emission Reduction in Agriculture and Rural Areas* and *Guidance for Promoting Energy Saving and Emission Reduction in Fisheries* in November and December 2011 respectively, while MOH released the *Notice on Further Strengthening Energy Saving and Emission Reduction in Medical and Health Institutions* in January 2012.

Building energy efficiency has been comprehensively promoted. Building energy consumption accounts for almost 30% of the total in China, for which its reduction has been an important concern of CCICED over the years. In 2011, CCICED recommended setting up the access threshold of energy efficiency within the industry and conducting special energy consumption assessment for new, large public buildings and commercial housing. Projects incompliant with mandatory standards shall not be submitted for completion. It was also advised to introduce a verification

and licensing system for building energy efficiency. MOF and MOHURD announced the building energy efficiency planning and the technologic planning for building energy efficiency last year to initiate the comprehensive efforts in building energy efficiency. In April 2012, the two ministries jointly issued the *Implementation Views on Accelerating the Development of Green Building in China*. It establishes the intention that green building will account for over 30% of new construction in 2020, and that energy consumption levels and use in the construction will be close to or reach the level of developed countries at this stage. In the 12th FYP period, efforts shall be made to establish an institutional mechanism conducive to the development of green building and promote the evaluation labeling for new single buildings. And the green building standards will be expanded in 2014 to both government-invested public welfare buildings and the affordable housing in municipalities directly under the Central Government, planned cities and capital cities. According to the *12th FYP Plan for Building Energy Efficiency* announced later, MOF and MOHURD plan to reduce 116 million tons of standard coal in the five years by developing green building, reforming the heating system, and enhancing public building energy regulation. They also strive for the integrated application of renewable energy in buildings to provide alternative 30 million tons of standard coal to replace conventional energy. MOST's *12th FYP Plan for the Development of Green Building Technologies* states, with reliance on scientific and technological progress, to promote the large-scale development of green building, significantly enhance the capacity in independent technological innovation and advance the elevation of capacities in planning and design, technological preparation, project implementation, operation and management for green building, so as to consolidate the core competitiveness and change the development mode of the whole industry. At the local level, Tianjin has developed the *Regulations for Building Energy Saving*, while Yinchuan rolled out the *Regulations for Building Energy Conservation*.

Work has been put into practice to save energy and reduce emissions. Implementation is the key to accomplishing the set targets. Experience in the 11th FYP period showed that enhanced monitoring, reporting, evaluation, assessment and supervision of law enforcement fill a crucial role in attaining the targets. CCICED proposed in 2011 that efforts should be made to enhance the monitoring, indicator and assessment system, strengthen target responsibility assessment, and establish a sound reward and punishment system. To regulate the audit of major pollutant emissions in the 12th FYP period, MEP has in succession formulated the *Rules for Calculating the Reduction of Major Pollutants in the 12th Five-Year Plan Period* and *Methods for Coefficient Accounting in Monitoring the Reduction of Major Pollutants in the 12th*

Five-Year Plan Period. It requires that departments of environmental protection at all levels should supervise and inspect the power enterprises within the scope for specified times. “Inspection should be made at least once a month and supervisory monitoring once every three months” to key enterprises under supervision. At the local level, Zhejiang, Ningxia Hui Autonomous Region, Wuhan, and Nanjing have developed measures to strengthen energy management, regulate energy supervision, and ensure the implementation of energy-saving laws and regulations.

3. Steady progress in green economic policy

In 2011, CCICED recommended continuing to improve the market mechanism; strengthening policy guidance and support to the development of the green economy; and guiding and promoting the greening and upgrading of industrial structure through comprehensive and balanced use of taxation, finance, green procurement and transfer payments.

China has accelerated the development and implementation of a series of environmental and economic policies since 2011, and achieved positive results in environmental protection and industrial restructuring via effective economic instruments.

Green credit policy continues to deepen. *Views of the State Council on Strengthening the Key Work in Environmental Protection* calls for “increased credit support to enterprises and projects in compliance with environmental requirements and credit principles”. Green Credit Guidance issued by CBRC in February 2012 provides specific practice regulations for the green credit of banking financial institutions. Banking financial institutions should promote green credit from a strategic height; increase support for the green economy, low-carbon economy and circular economy; prevent environmental and social risks; and enhance their environmental and social performance. On this basis, the credit structure can be optimized, the service level raised, and the mode of development transformed. The Guideline also requires that the Board or the Council of banking institutions establish and enforce the concept of green credit: conservation, environmental protection, sustainable development, and importance should be attached to the role of banking financial institutions in promoting comprehensive, coordinated and sustainable socio-economic development in order to establish a win-win model of sustainable development.

Positive progress has been made in environmental pollution liability insurance.

Views of the State Council on Strengthening the Key Work in Environmental Protection calls for “establishing a sound environmental pollution liability insurance system and carrying out the pilot of mandatory liability insurance.” *The 12th Five-Year Plan for National Environmental Protection* also demands “setting up a sound environmental pollution liability insurance system and studying to establish a compulsory insurance system for enterprises with high environmental risk, such as with heavy metal emissions.” MEP has also rolled out supporting technical specifications for environmental pollution liability insurance. Following the measures for environmental risk grading of chloral-alkali enterprises, MEP issued the *Environmental Risk Assessment Guide – Measures for Environment Risk Grading of Sulfuric Acid Enterprises (Trial)*, *Opinions on the Identification and Assessment of Environmental Pollution Damages* and *Recommended Methods for Calculating Environmental Pollution Damages (Edition I)*. Local pilots for environmental pollution liability insurance continue to proceed. In 2011, Sichuan, Hebei and Inner Mongolia launched the pilot, making the total number of pilot provinces 13.

A comprehensive directory in line with environmental economic policies is developed and improved. *Views of the State Council on Strengthening the Key Work in Environmental Protection* calls for the “development of a comprehensive directory for environmental protection”, and the adjustment of import and export tariff policy for products causing “Great Pollution And Great Environmental Risk”. To this end, MEP and industry associations developed this directory in accordance with environmental and economic policies (2011), including 514 types of product technologies causing high pollution and environmental risk, 42 kinds of environment-friendly technologies, and 15 kinds of major environment-friendly equipment for pollution reduction. This directory provides environmental basis for the development of policies about export tax rebates, processing and trade, tax incentives, safety supervision and credit supervision. By the end of 2011, export tax rebates had been cancelled for nearly 300 types of such products that are banned for processing and trade. This reflects the important role of environmental protection in optimizing the economic growth.

A pilot emissions trading system kicked off. *Views of the State Council on Strengthening the Key Work in Environmental Protection* calls for “carrying out the pilot paid use and trading of emission rights, establishing the national center and developing the market for emissions trading”. Vice Premier Li Keqiang set forth in the 7th National Conference on Environmental Protection the economic, environmental and technical benefits of emissions trading, and called for the progressive promotion of emissions trading based on the experience at home and

abroad. In 2011 CCICED recommended “the full introduction of the market mechanism for its potential and role in energy saving and emission reduction, the implementation of the emissions trading system, and the formation of market and platform for conventional pollutants and carbon emissions trading.” Last year witnessed significant achievement in emissions trading and conventional pollutants trading. In October 2011, the General Office of NDRC issued the *Notice on Carrying out the Carbon Emissions Trading Pilot*, launching the pilot in Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong and Shenzhen. To regulate the voluntary emissions trading activities, NDRC issued the *Interim Measures for Voluntary Greenhouse Gas Emissions Trading* in June 2012. The *12th Five-Year Plan for National Environmental Protection* also states the emissions trading scheme for conventional pollutants and heavy metals and “encourages provinces (autonomous regions, municipalities) to implement the pilot replacement and trading of heavy metal emissions in non-priority areas.” Up to present, a total of 10 provinces (autonomous regions and municipalities directly under the Central Government), namely Jiangsu, Zhejiang, Tianjin, Hubei, Hunan, Shanxi, Inner Mongolia, Chongqing, Shaanxi, and Hebei, have been identified as national emissions trading pilot provinces.

The reform of resource pricing mechanism also moves forward, as the price ladder that CCICED has advocated for years was finally adopted in the field of household power consumption. It has been put into practice in most provinces and cities across the nation since July 1, 2012. A nationwide tax reform for the ad valorem for crude oil and natural gas has been implemented. CCICED suggested in 2011 “the active introduction of a tax system conducive to green development, accelerated reform of resource tax reform [...] an appropriate increase in the tax rate of the current oil and energy-consuming products.” In September 2011, the State Council revised the *Interim Regulations of People's Republic of China on Resource Tax*. Crude oil and natural gas resources tax is charged based on ad valorem rather than amount, with a tax rate of 5%. It marks that China’s resource tax reform has taken a significant step, and moreover, it facilitates the differential regulation and inhibits the waste of resources.

Green government procurement has driven green consumption. Government procurement boosts green economic development, but also imposes demonstration effects. CCICED has emphasized the important role of government green procurement in both two pieces of policy recommendations about green consumption raised in 2011. It suggested the introduction of green product procurement indicators, common principles and guidelines for government green procurement on the basis of

the government's public procurement platform and the standards of environmental labeling products. It called for the establishment of an environment information network and disclosure system for government green procurement. *The 12th Five-Year Plan for Environmental Protection* requires a progressive increase in the proportion of environmentally friendly products in green procurement, and the research and implementation of government procurement of environmental services, with a comprehensive directory for environmental protection. *The 12th Five-Year Plan for the Development of National Strategic Emerging Industries* released in July 2012 endorses “vigorously promoting environmental labeling products and the government green procurement system, and actively promoting green consumption.” MOF announced the adjusted 11th and 12th lists of energy-saving products for government procurement, and the 9th and 10th lists of environmental labeling products for government procurement in January and July 2012 respectively. MOF also requested improving the priority procurement and mandatory procurement system for energy saving and environment-friendly products in May 2012.

4. Progress made in green investment and green trade

CCICED recommended in 2011 that China should adjust and improve its policies to attract investment and facilitate foreign direct investment (FDI) to strategic sectors, such as high-tech and environmental strategic emerging industries. It also advised to revise and update the existing *Catalogue for the Guidance of Foreign Investment Industries*, and revise and improve China's legal framework to attract foreign investment and encourage green investment based on the advanced experience of FDI contributors, especially those with higher environmental standards.

China amended the *Catalogue for the Guidance of Foreign Investment Industries* in December 2011, the fifth time since the enactment in 1995. In comparison with the 2007 amendment, the new catalogue further encourages foreign investment in the field of energy conservation and environmental protection. Among the fields where the investment is encouraged are the manufacturing of new energy vehicles, including the research and manufacturing of new energy vehicles and major parts and accessories; construction and operation of charging stations; development of energy-saving technologies; recycling of various products (including plastic products, electronic products, automobile mechanical and electrical equipment, rubber, metals and batteries); as well as strategic emerging industries, such as IT, biotechnology, high-end equipment manufacturing, new energy, and new materials. To inhibit the excess capacity and blind duplicate construction, entries like polysilicon and coal chemicals are removed from the category. This new catalogue fully embodies the

thought of the Chinese Government to accelerate and promote the transformation of green economic development.

Green trade is an important means of promoting industrial restructuring and developing the green economy in China. To this end, CCICED made the recommendation in 2011 of driving ahead domestic industrial restructuring and upgrading via decreased tariffs, in order to encourage the import of and reduce the domestic production of energy-intensive products. Exports of products with low power consumption and low environmental damages are encouraged and expanded. The export tax rebate is completely abolished and export tariffs are levied for resource-based products with high energy consumption and high pollution.

With adherence to the green trade policy, China continues to encourage the import of energy-intensive products and limit the export of resource-based products with high energy consumption and high pollution in 2012, in order to relieve the pressure on environmental resources. Moreover, to push ahead economic restructuring and the transformation of economic development mode, China has set lower provisional import tax rates on more than 730 kinds of commodities since January 1, 2012 to encourage the import. The import tax rate averages to 4.4%, over 50% lower than the most favored nation (MFN) rates. Among the five categories of these products are energy resources (including coal, coke, refined oil, marble, granite, natural rubber, rare earth, copper, aluminum and nickel) and key equipment and spare parts required for strategic emerging industries such high-end equipment manufacturing, next-generation IT, and new energy vehicles (including jet looms, turboshaft aircraft engines, high-voltage power lines, phone camera components, high-definition camera, and major moulds for coupe body stamping). Meanwhile, MOF has announced that export tariffs are levied in 2012 at the provisional tax rates for resources-based products with high energy consumption and pollution, such as coal, crude oil, fertilizer, and ferroalloy. In the first half of 2012, the exports of such products decreased by 3.8%.

(ii) Enhanced prevention of heavy metal pollution, especially mercury pollution

In view that frequent heavy metal pollution incidents in recent years, especially mercury pollution incidents, have posed a serious threat to the ecological environment and the health of the people, CCICED recommended in 2011 that attention should be attached to the problem of mercury contamination and heavy metal pollution, which is a serious danger to public health and should be brought under comprehensive prevention and control. On December 4, 2011, MIIT released the *12th Five-Year Plan*

for the Nonferrous Metal Industry. In accordance with the requirements of the *12th Five-Year Plan for the Comprehensive Prevention and Control of Heavy Metal Pollution* (released in February 2011) and the *12th Five-Year Plan for the Joint Prevention and Control of Regional Air Pollution in Major Areas*, future work should follow the principles of prevention in the source: block in the process, cleaner production and end treatment, to enhance the integrated prevention and control of heavy metal pollution in major areas. The *12th Five-Year Plan for the Nonferrous Metal Industry* calls for strict access conditions, optimized industrial layout, and prohibits the addition, renovation, and expansion of heavy metal pollution projects in areas under special protection. This includes nature reserves, drinking water source reserves, and areas for high environmental conditions, such as large- and medium-sized cities, the suburbs, and residents-concentrated areas. In terms of mercury pollution prevention and control, the plan proposes only retaining the native mercury smelting enterprise Shaanxi Mercury and Antimony Technology Co., Ltd. at the end of the 12th FYP period, and outlawing others. Mercury catalyst recycling enterprises should have mercury vapor recovery units, and the establishment of new mercury catalyst recycling business should be under strict control across the country, except in Wanshan of Guizhou.

(iii) New progress in the prevention and control of environmental pollution

1. Implementation of the new *Ambient Air Quality Standards*

China has suffered serious air pollution for a long time, but the *Ambient Air Quality Standards* are too lenient, leading to a huge gap in the officially announced air quality results and the feelings of the masses. The original *Ambient Air Quality Standards* has been unable to meet the actual needs of the public for clean air.

A new *Ambient Air Quality Standards* (GB3095-2012) was promulgated by MEP in February 2012 on the basis of the revision to the original one (GB3095-1996): addition of PM_{2.5} limit and 8-hour ozone concentration limit, adjustment to PM₁₀, NO₂, lead, and benzo(a)pyrene concentration limits.

In view of the characteristics of air pollution, the level of economic development and environmental management requirements in different regions, the newly revised standards will be implemented in phases and the specific deadlines are as follows: 2012 for the Beijing-Tianjin-Hebei region, the Yangtze River Delta, the Pearl River Delta among major regions, municipalities directly under the Central Government and the provincial capitals; 2013 for 113 key environmental protection cities and the

National Environmental Protection Model Cities; 2015 for cities at the prefecture level or above; and January 1, 2016 for the remaining parts of the country. MEP encourages provinces, autonomous regions, and municipalities directly under the Central Government to implement the new standards before the specified deadline in accordance with the actual situation and local environmental needs.

Implementing the new standards is on the premise of appropriate monitoring capacities at localities. MEP has released the Opinions on Strengthening the Capacity Building of the Ambient Air Quality Monitoring, specifying the overall objective in the 12th FYP period as building a state-of-the-art ambient air quality monitoring and early warning system; integrating such information resources as the atmospheric background monitoring network, rural monitoring network, acid deposition monitoring network, monitoring network for dust weather impact on the atmospheric environment, and GHG test monitoring; increasing monitoring indicators; establishing a sound and unified quality management system and point management system; and improving the technical methods and information release mechanism for air quality assessment. By 2015 it aims to build an efficient national ambient air quality monitoring network featuring reasonable layout, comprehensive coverage, complete functions and indicators. In May 2012, MEP reviewed and approved in principle the *Plan for Air Pollution Prevention and Control in Key Areas (2011-2015)* which explicitly clarifies the guiding thought, basic principles, planning scope, objectives, tasks, and priority projects and safeguards.

2. Implementation of the most stringent water conservation measures

Water pollution prevention and control and water conservation continue to deepen. Last year, four important documents related to water pollution control and water conservation were introduced: *National Plan for Groundwater Pollution Prevention and Control (2011-2020)*, *Plan for Water Pollution Prevention and Control in Major River Basins (2011-2015)*, *Views on the Implementation of the Most Stringent Water Management System*, and *National Plan for Water Function Zoning of Major Rivers and Lakes (2011-2030)*.

In October 2011, the State Council approved the *National Plan for Groundwater Pollution Prevention and Control (2011-2020)*. It plans to gain a general picture of groundwater pollution in 2015 and launch a comprehensive pilot for groundwater pollution remediation to gradually remedy soil affecting groundwater environment safety and preliminarily control groundwater pollution sources. A comprehensive groundwater environmental regulatory system shall be established and urban

centralized groundwater drinking water sources shall be improved, curbing the trend of groundwater quality deterioration. In 2020, the comprehensive monitoring will cover typical groundwater pollution sources and the soil affecting groundwater environment safety will be brought under effective control. Scientific groundwater remediation will be made to basically ensure the safety of important groundwater drinking water sources; groundwater environment regulatory capacity will be enhanced; groundwater quality in major areas significantly improved; groundwater pollution risks effectively prevented; and groundwater pollution prevention and control system completed.

In January 2012, the State Council issued the *Views on the Implementation of the Most Stringent Water Management System*, calling for a red line for the development and utilization of water resources. In 2030, national water consumption will be controlled below 700 billion m³, and with a specified red line, water efficiency will reach or be close to the world advanced level. In 2015, national total water consumption shall not exceed 635 billion m³, and the water quality compliance rate of such important function zones as rivers and lakes will exceed 60%. In 2020, national water consumption will be limited within 670 billion m³ and the water quality compliance rate for major water function zones exceed 80%, and the water quality of urban water supply sources will fully meet the standards.

In February 2012, the State Council approved the *National Plan for Water Function Zoning of Major Rivers and Lakes (2011-2030)* designed by Ministry of Water Resources, NDRC, and MEP. A two-tier system is introduced for water function zoning. In Tier I, there are protection zones, reserved zones, development and utilization zones, and buffer zones; and it mainly coordinates regional water use, taking into account the demand of regional sustainable development for water resources. In the protection zones, development and utilization activities that could affect water protection, natural ecosystems and rare and endangered species are banned. Reserved zones are watersheds reserved for future sustainable use of water resources, and in principle the water quality should be maintained. Development and utilization activities in the buffer zones, in principle, should affect the function of adjacent water function zones. As to Tier II, development and utilization zones are further divided into seven categories: drinking water source zones, industrial water zones, agricultural water zones, fishery water zones, scenery and recreation water zones, transitional zones, and sewage control zones. Tier II is used to coordinate the relationship between different water-use industries. Nationwide, water function zones have numbered to 4493, and the water quality objective is identified as Grade III or better for 81% of them.

In May 2012, MEP issued the *Plan for Water Pollution Prevention and Control in Major River Basins (2011-2015)* with the approval of the State Council, specifying the water quality objectives for the year 2015. In accordance with the *Standards for Surface Water Environmental Quality (GB3838-2002)*, the overall water quality in major river basins will be improved from the moderately polluted to the slightly polluted, the proportion of Grade I-III water sections increased by 5 percentage points while the proportion of Grade V water sections down by 8 percentage points. The overall water quality of the Songhua River Basin will turn better from the slightly polluted, and water quality improvement will also be seen in the mildly polluted Huaihe River Basin and severely polluted Haihe River Basin. In Liaohe River Basin and the upper and middle reaches of Yellow River Basin, the moderately polluted water will be improved to the slightly polluted. In Taihu Lake and Chaohu Lake, the mild eutrophication will be maintained with light improvement. Dianch water will undergo a shift from severe eutrophication to moderate eutrophication, or if possible, mild eutrophication. Overall water quality in the Three Gorges Reservoir and its upstream basins will remain good, while that of Danjiangkou Reservoir and the upper basins will remain excellent.

To further strengthen the environmental protection for centralized drinking water sources, direct and promote the implementation of *National Protection Plan for Urban Centralized Drinking Water Sources (2008-2020)*, and enhance the level of drinking water safety, MEP issued the *Environmental Protection Guide for Centralized Drinking Water Sources (Trial)* in March 2012.

Local governments have also exerted more efforts in water conservation. Fujian, Nanjing, Hefei, Changsha, Xiamen and Zibo have rolled out regulations for protecting (managing) the water environment (water resources), while Zhejiang, Qinghai, Sichuan, and Baotou have formulated regulations on the protection of drinking water sources.

(iv) New progress in environmental rule-of-law in China

1. Resources, energy and environmental laws and regulations

China continued to move forward in environmental and resource protection laws and regulations in the past year. Revised *Cleaner Production Promotion Law* and the *Amendment to the Law of Environmental Protection* further strengthen corporate environmental responsibility. Despite that the Amendment does not mention environmental public interest litigation, which wins a loud voice, the newly revised

Civil Procedure Law includes written provisions about public interest litigation, which is also a breakthrough for environmental public interest litigation. A sound legal system provides safeguard for green economic development. CCICED has recommended to the Chinese Government that we shall, taking the opportunity of law amendment, strengthen government responsibility and environmental civil liability and clarify corporate environmental responsibility. All of the three laws that have or are being revised follow this principle.

Cleaner Production Promotion Law, which was revised and adopted by NPC in February 2012, expands the scope of mandatory cleaner production audit. High energy-consuming enterprises that exceed the criteria of energy consumption per unit product fall within the scope. It also clearly states that enterprises within the scope should report the audit results to government departments at the county level or above and publicize the results in the local media for social supervision. In addition, the newly adopted law highlights the supervision, evaluation and acceptance of the Government. It ensures that relevant departments of local people's governments at or above the county level shall supervise the mandatory cleaner production audit in enterprises, and when necessary, conduct assessment and acceptance for the implementation results. Expenses incurred are included in the government budget at the same level, and enterprises shall not be charged for the assessment and acceptance.

The amendment to *Civil Procedure Law* was adopted in August 2012 and adds the provisions about public interest litigation, namely: "Authorities and organizations designated by law can initiate legal proceedings against behaviors harmful to the environment and public interests including the legitimate rights and interests of consumers." It marks the formal establishment of the environmental public interest litigation system in China.

In September 2012, the amendment to the *Law of Environmental Protection* was discussed in the NPC Standing Committee, the first in 33 years since the *Law of Environmental Protection (Trial)* was promulgated in 1979. China has experienced tremendous economic and social change in the past years and is confronted with unprecedented challenges in environmental protection. *Law of Environmental Protection* has lagged behind in protecting the environment and safeguarding citizens' health and environmental interests. Voice for law modification has never been interrupted over the years, so the long-awaited revision finally put on the agenda bears very high expectations of social communities. NPC Revision Notes state the expected breakthrough in four aspects: clarify the guiding thought for environmental protection

in the new century, strengthen government accountability and supervision, converge and standardize the legal system, and promote the implementation of the *Law of Environmental Protection* and related laws. To address the nonfeasance of local governments, environmental departments, government staff and repeated environmental violations, the Law improves the legislation for environmental law enforcement supervision, highlighting government supervision of the public, legislative branch supervision of government departments, and a top-down manner of governmental supervision. The amendment also provides a solid legal basis for major policy measures in promoting energy efficiency and emission reduction, including total emission control and regional restrictions. In addition, the law makes the legal convergence for fundamental environmental management systems, such as environmental monitoring, environmental impact assessment, environmental planning, and regional pollution prevention and control. Enhanced corporate responsibility for environmental protection is also a highlight of the amendment.

Apart from the amendments to important laws, the relevant departments of the State Council, in accordance with the division of labor, have formulated environmental regulations that perform an important role in green economic development, energy conservation, emission reduction, and protecting the lives and property safety of the people. Regulations, rules and normative documents rolled out by the State Council and relevant administrative department in the past year include: *Regulations on the Safety Management of Radioactive Waste*, *Implementing Rules for the Provisional Regulations of the People's Republic of China on Resource Tax (2011)*, *Interim Measures for Reviewing River Hydropower Planning Reports and EIA Reports* jointly promulgated by NDRC and MEP, *Regulations of the People's Republic of China on the Investigation and Handling of Marine Pollution Accidents from Ships* and *Measures for Managing Soil and Water Conservation Monitoring Qualification for Production and Construction Projects* promulgated by Ministry of Transportation, *Regulations on the Pipeline Safety for Hazardous Chemicals*, *Measures for the Safety Supervision and Management of Hazardous Chemicals Project*, *Regulations on the Registration of Hazardous Chemicals (2012)* issued by State Administration of Work Safety, *Green Credit Guideline* issued by CBRC, *Measures for On-site Supervision and Inspection of Automatic Monitoring Facilities for Pollution Sources*, and *Measures for Managing the Operation Qualification License for Environmental Pollution Control Facilities (2012)* issued by MEP, *Interim Measures for Voluntary Greenhouse Gas Emission Reduction and Trading* issued by NDRC, as well as *Measures for Fund Collection and Use for Disposing Waste Electrical and Electronic Products* jointly promulgated by MOF, MEP, NDRC,

MIIT, General Administration of Customs, and State Administration of Taxation

2. Justice promotes environmental protection

The judiciary is also active in promoting environmental protection. In 2011, the Supreme People's Court launched the special work for the judicial protection of water resources, in which *Provisions on Issues Related with the Hearing of Ship Oil Pollution Compensation Disputes* was implemented to provide the sound, unified hearing rules. Mediation and trial guidance were strengthened in oil pollution cases, and a number of oil spill damage compensation cases were processed, involving NOBEL from Jes Shipping Co.Ltd, Paulo Silva, and Tasman Sea. The Supreme People's Court, in collaboration with environmental and marine departments, has explored the establishment of a judicial mechanism for protecting water resources across administrative regions.

Environmental protection tribunals are established to drive ahead the environmental public interest litigation system. By December 16, 2011, a total of 42 environmental protection tribunals had been set up in 12 provinces (municipalities) in China. In the perspective of the level of the court, 32 grassroots courts, nine intermediate courts and one high court set up the tribunals. These tribunals play an effective role in the settlement of environmental cases, promoting environmental public interest litigation across the country. In October 2011, Qujing Intermediate People's Court accepted the public interest litigation that the Institute for Environmental Studies of the Friends of Nature in Beijing, Green Volunteer League of Chongqing and Qujing Municipal Bureau of Environmental Protection filed against Yunnan Luliang Chemical Industrial Co., Ltd for chromium slag pollution. This is China's first case of environmental public interest litigation filed by grassroots NGOs.

(v) Social management innovation under environmental public participation and appeal and information disclosure

Several important events occurred later in the year that demonstrated the enormous power of environmental protection in the private sector, and also indicated the rise of citizens' environmental awareness. Citizen participation in China has climbed to a new level. The increased level of citizen participation and the rise of the civil power will change the pattern of the entire environmental governance.

One of the most prominent events is that all the citizens have been involved in the discussion on whether the PM2.5 indicator should be included in the *Ambient Air*

Quality Standards. Beijing suffered haze for days in October 2011, but the official monitoring data indicated that the air was “slightly polluted”, stirring strong dissatisfaction of the people. Haze is primarily triggered by the PM2.5, which was not specified in the then *Ambient Air Quality Standards*. It therefore leads to a gap between the official data and people’s impressions. The voice of citizens caused the attention of the decision makers on November 15, 2012, when meeting the members of CCICED who participated in the Annual General Meeting. Premier Wen said the monitoring standards of environmental quality should be improved and gradually reach the same level with international standards to make the result of monitoring consistent with peoples’ perceptions. Vice Premier Li Zheqiang also demanded at the 7th National Environmental Protection Conference that the air quality standards should be revised and published as soon as possible and the evaluation methods of air quality should be also improved and be taken into practice based on the air pollutants features, economic development and air quality status. He reiterated the efforts to align the standards of China with developed countries and make the peoples’ feeling concurrent with the evaluation result of environmental quality. Finally PM2.5 was included in the indicators in the new *Ambient Air Quality Standards* (GB3095-2012) for implementation in phases across China.

Two other cases are group incidents instigated by construction projects. For fear of the environmental pollution caused by Hongda’s molybdenum copper project of polymetallic deep processing and comprehensive utilization, the local people gathered outside the government offices in Shifang of Sichuan Province on July 2, 2012, which then evolved into a group incident. On the afternoon of July 3, the Shifang government announced the decision to stop the construction project. Also in July, citizens took to the streets for protest and rushed into the government offices in Qidong of Jiangsu, a developed province in eastern China out of the worry that the Japanese Oji Paper Group’s pollution sewage facilities would impact their lives and health of the public. Subsequently, Qidong government announced it would permanently cancel the sewage discharge project.

Prior to this, group incidents have occurred in a number of places due to the environmental problems. However, the unique difference is that the above-mentioned projects have neither been put into production nor resulted in a de facto environmental and health damage. It is the opaque government decision-making that the public is dissatisfied with, and causes the distrust in these issues. Environmental issues have sparked conflicts between the public and government regulators, rather than the public and polluters in the past. Similar events occurred in eastern and western China within a month and showed that the Chinese public’s environmental consciousness and

awareness of rights are generally improved. In this context, the conflict between the environment and development is bound to be more intense. As the *People's Daily* commented, "China enters a special environmentally sensitive period for social development. On the one hand, in light of the actual conditions, China cannot skip the gradient industrial transfer and 'zero pollution' is unachievable for some industrial projects. On the other hand, people's environmental awareness and awareness of their rights are rapidly enhanced. Environmental interests-related conflicts are a manifestation of social progress and a reflection of transformational development."

A look into these three incidents, which differ in the form of public participation and causes, reveals that a number of problems hinder the formation of sound government governance in China with rapid economic development and dramatic change in social structure.

First, people are more inclined to protecting the environment as their rights and environmental awareness increase, while the attention of the government remains on the economic aspect.

Second, the public has an increasing demand for better environmental quality. In some local governmental decision-making, environmental laws and regulations are sacrificed for economic development. The endowed right of public participation is in name only for the government, while it is regarded as a substantive power by the public who calls for the solid compliance with the law to defend the rights.

Third, there is a huge divide between the cognitive level required for public decision-making and the information held by the government. When the general public does not grasp the comprehensive information for scientific decisions, and when their information demand is not met due to the lack of communication between the governments—except for some fragmented information decisions—it is inevitable for them to make irrational moves. What is worse, the declining government integrity impedes the flow of decision-making information. As a result, the public takes a negative attitude to the original scientific content.

Fourth, an undesirable interactive mode for the public and the government is taking shape.

Although the result of the three incidents was that the public's demands were met, the facts have not yet been sorted out nor the causes clarified, including the decision-making process, decision-making content, lack of pre-communication and

information disclosure, and the pollution itself. If the incidents are rooted in only procedural problems, the concessions of local governments will allow the public to equate all similar projects, making it difficult to develop such projects in the future. Local governments, not limited to the associated government, will also face extensive decision-making pressure.

Local governments have not changed their thought about development, which coupled with the lack of the rule of law and crude management style leads to the decline in trust in the government. It can be predicted that such intense conflicts will frequently occur unless adjustments are advanced in the government's handling of environmental issues.

Information disclosure is fundamental to public participation. Environmental protection is one of the eight key areas that the Chinese government designates for the implementation of information disclosure. Environmental information disclosure leads information disclosure work in China. In 2007, following the issuance of the Information Disclosure Regulation of the State Council, the Ministry of Environmental Protection promulgated the Method of Environmental Information Disclosure, which made it the first ministry to specify how to implement the Regulation. In August of 2012, the Ministry of Environmental Protection held the National Conference on Environmental Information Disclosure, at which Minister Zhou Shengxian delivered a speech and summarized the achievements made in information disclosure: promulgations of a series of complementary documents regarding information disclosure, increasing the amount and scope of compulsory information, timely disclosure of environmental incidents, facilitation for application of information disclosure, and diversification of opening channels. Minister Zhou also indicated that major efforts will be invested in the future with respect to the disclosure of information on verification and permits, ambient air quality and significant, and severe incidents; strengthening of team building in handling information disclosure applications, and strengthening the process related to application-triggered information disclosure.

(vi) Actively promoted international environmental cooperation

As a responsible power, China has been active in promoting international environmental cooperation to cope with global environmental challenges. It has played a constructive role in the major international environmental conferences convened since October 2011, namely the Durban Conference, the Nuclear Security Summit in Seoul, and the 'Rio +20' Summit. "China is a responsible big developing

nation willing to live up to its responsibilities,” said Premier Wen Jiabao in the ‘Rio +20’ Summit, “and the better China develops, the more opportunities China will present and the greater contributions China will make to the world.”

China is an active promoter of the global climate negotiations. Prior to the United Nations climate conference in Durban, China proposed a set of fair and balanced solutions for the success of the conference in accordance with the principle of “common but differentiated responsibilities”. It insists on a second commitment period of the *Kyoto Protocol* in accordance with the requirements of the Bali Action Plan, and calls for the inclusion of developed nations not committed in the *Kyoto Protocol* to make comparable emission reduction commitments. Under the United Nations Framework Convention on Climate Change, the developing countries carry out voluntary emission reduction actions included in the final overall program.

In the Seoul Nuclear Security Summit held in March 2012, China submitted the National Progress Report on Nuclear Safety. Chinese President Hu Jintao delivered an important speech, and put forward a four-point proposal on improving nuclear safety in the new situation: 1) adhere to the scientific and rational thought of nuclear safety, enhance confidence in the development of nuclear energy, and promote the safe and sustainable development of nuclear energy; 2) strengthen the capacity building in nuclear safety and bear the national responsibility; 3) deepen international exchanges and cooperation and enhance global nuclear security; and 4) eliminate the root causes of nuclear proliferation and nuclear terrorism. With adherence to the purposes and principles of the UN Charter and mutual trust, mutual benefit, equality and cooperation in nuclear safety, insist on the peaceful settlement of hotspot issues and international disputes, and create a favorable international environment for enhanced nuclear safety.

In the ‘Rio +20’ Summit (United Nations Sustainable Development Conference) held in June 2012, Premier Wen Jiabao delivered an important speech and comprehensively expounded China’s principled stance on the sustainable development of international cooperation. He made three suggestions on promoting the continued development. 1) Stick to the concept of fair and equitable development with openness and tolerance. Carry forward the spirit of partnership, and adhere to the Rio principles, especially the principle of “common but differentiated responsibilities”, to ensure the realization of global sustainable development and the rights of countries for fair development. 2) Actively explore an effective mode of green economic development. Encourage countries to independently determine the path and process of the green economic transformation. 3) Improve the global governance mechanism.

Give full play to the leading role of the United Nations and form an effective framework for sustainable development mechanism to enhance the capacities in guidance, coordination, and execution, so as to achieve better coordination of economic development, social progress and environmental protection. Improve the voice and decision-making powers of developing countries, and address the practical difficulties of developing countries in capital, technology and capacity building. Establish a new partnership for sustainable development, including relevant international bodies, governments and the public. Premier Wen Jiabao announced that China would donate \$6 million to the United Nations Environment Programme Trust Fund to promote sustainable development in developing countries, such as projects and activities to improve the capacity in environmental protection. China would like to assist in the training of management and technical personnel for ecological protection and desertification control, and provide facilities for automatic weather stations and high-altitude observation radar stations and forest protection equipment. Based on pilot experience in various countries, China will build the global S&T cooperation network for the best practices in local sustainable development. China would also allocate RMB 200 million for a three-year international cooperation program to help the small island countries, the least developed countries, and African countries cope with climate change.

The international community generally believes that Premier Wen Jiabao's speech at the opening ceremony sent a clear, positive message about China's commitment to the sustainable development and set the tone for the summit. Against the background of the bleak world economic outlook and the simmering European debt crisis, the initiatives announced by Premier Wen Jiabao received widespread positive response, boosted the confidence of the international community and maintained the momentum of international cooperation in sustainable development. Thus, the speech played an important role in the positive results of the event. According to Brazilian mainstream media, Premier Wen Jiabao's speech demonstrates the courage to take the shared responsibilities for protecting the Earth's environment. It shows China faces up to the objective reality of different development conditions in countries and safeguards the interests of vast developing nations with firm adherence to the principle of "common but differentiated responsibilities". It points out the direction for the realization of sustainable development. In particular, Premier Wen Jiabao announced a series of practical measures to help small island states, least developed countries and African countries deal with climate change, and thus won high appreciation and warm applause from present representatives, in sharp contrast to developed countries who negatively "have said more than done". Premier Wen

Jiabao's speech not only showcased the good image of a responsible nation, but also boosted the morale of the developing countries as a whole camp, and thereby played an important and active role in the success of the Summit.

IV Review of the major policy recommendations in the 4th phase of CCICED

Centering on the relationship between the environment and the economy, CCICED has been active in promoting environmental improvement and economic development, and contributed suggestions and ideas in the 4th phase (2007-2011) for green economic development, green growth, green transformation, and building an environment-friendly society in China. It looked into China's environmental protection from a more macro perspective, with the focus shifted from the traditional pollution prevention to ecosystem management and mechanism innovation. The successful conclusion of the 5th Joint Meeting of the 4th CCICED Council in 2011 marks an end to the five-year work in the 4th phase.

In the recent five years, CCICED has brought together experts and scholars at home and abroad under its unique operation mechanism for advice and suggestions, with a close link to the pulse of the development and the focus on major issues in environment and development in China. These recommendations have influenced environmental policy practice via various channels. Among them, some were adopted directly, while others stirred domestic discussion on particular policy issues, advancing or changing the policy process in an indirect manner. Some recommendations attracted the attention of decision-makers immediately, while some became real policies a few years later. In view of this, a look at a longer time span will help comprehensively understand the relevance of CCICED's policy recommendations with the trend of environment and development in China, and the role of CCICED in development and impact assessment.

CCICED at 20: Environment, Impacts and Future Opportunities released in 2011 offers a comprehensive picture of the possible difficulties in assessing the impact of the CCICED policy recommendations. It states that CCICED as an advisory body faces such difficulties as the ownership recognition of outputs, the time difference, and the gap between expectation and reality. For this consideration, this report includes the consistency of the development direction of environment and policies in China and the work content of CCICED as an important criterion to assess the impact of CCICED's policy recommendations, plus a systematic review and cases.

CCICED at 20: Environment, Impacts and Future Opportunities reviews the research background of the last two decades and its relevance to the most pressing environment and development issues. It also performs an in-depth analysis of the possible significant impact of the core recommendations on the environment and development in China, based on the background of the five-year research and proposals of the 4th CCICED Council. The efforts here focus on the acceptance and adoption of recommendations over the years, and their relevance to Chinese policies, echoing the purpose of *CCICED at 20: Environment, Impacts and Future Opportunities*, with the exception of a different timeline for analysis. For this reason, the background of research in the 4th CCICED Council covered in *CCICED at 20: Environment, Impacts and Future Opportunities* is not elaborated and instead, the recommendations adopted in the recent five years are reviewed.

Five themes were identified in the 4th phase: innovation and environment-friendly society (2007), mechanism innovation and harmonious society (2008), energy, environment and development (2009), ecosystem management and green development (2010), and green transformation of economic development mode (2011). A total of 13 task forces were set up for seven thematic research projects, based on which CCICED has submitted five reports on policy recommendations. All policy recommendations are stated in detail in the annual *Major Policy Progress in Environment and Development in China and Impact of CCICED's Policy Recommendations*. From a long-run perspective, the impact is lasting. Some proposals, though not adopted in the year, have been quietly put on the policy agenda or were reflected in the relevant policies and legislation in subsequent years. For example, CCICED recommended the market-based implementation in 2007, covering environmental taxes, energy resource taxes, green credit, environmental insurance, ecological compensation, and emissions trading. In the next few years, the Chinese Government launched in succession the pilots for green credit, environmental liability insurance, and carbon trading, and started drafting the *Regulations on Ecological Compensation*.

During the period of 'Rio+20' Summit in 2012, CCICED held a side event with the theme of "Rio 20, CCICED 20". Premier Wen Jiabao chaired the event and had a long discussion with CCICED members and ministers from the State Council on the sustainable development path choice for China and the world. Premier Wen Jiabao acknowledged CCICED's contributions and roles and said that the vigor of CCICED derived from its focus on sustainable development, which was a persistent topic. CCICED was an important platform not only in terms of enhancing environmental cooperation between China and other countries, but also in terms of its influence on

the development and environment in the world. Those annual themes CCICED selected were well fitted into Chinese demand priorities. Members of CCICED had devoted amounts of efforts to conduct research and raise recommendations, which provided important reference for policy making. Premier Wen Jiabao remembered his experiences of 15 years participating in CCICED activities and said he believed CCICED would continue its glory and have a wonderful tomorrow. Over the past 20 years, the mission of CCICED has been to introduce international experiences into China and put them into practice. ‘Rio+20’ Summit marks the beginning of a new epoch of CCICED, in which CCICED dedicates to sharing with the world its success, and together with the world develop solutions for common environmental challenges.

Box 4: Adoption of CCICED’s policy recommendations in the 4th phase

- 2007**
- Strengthen national capacity in environmental management and set up a larger ministry of environment department under the Central Government. (In March 2008, the 11th NPC meeting decided to set up MEP.)
 - Reform the performance evaluation system for local government officials, and incorporate the responsibilities of various environmental goals and policy objectives in the evaluation system. (In November 2007, the State Council forwarded the Methods for Assessing the Reduction of Major Pollutants, developed by State Administration of Environment Protection and countersigned by the Organization Department of the Central Committee and the relevant ministries, adopting the accountability system and vote veto system for responsible persons of local governments that fail to fulfill the tasks.)
 - Raise public awareness and enhance public participation, so that various circles of society play their roles in the strategic transformation, including the production, consumption, environmental health, oversight of local development, as well as direct participation in environmental improvement. (China exerted great efforts into publicity in the 11th FYP period to enhance public environmental awareness, increased public participation in amending the relevant laws, and stimulated the public to purchase energy-efficient and eco-friendly products by means of subsidies to green and energy-efficient products. *Views on Strengthening the Law-based Government Development* issued by the State Council in November 2010 states in Chapter IV “adherence to law-based, scientific and democratic decision making” that “incorporate public participation, expert evaluation, risk assessment, legality review and collective discussion as the necessary procedure in major policy decision making. Before major decisions are made, fully solicit for and absorb the opinions, and disclose the information or feedback about the views adopted and the rationale in an appropriate form. Improve the public hearing system for major decision-making, with expanded scope and standardized procedure of hearings. Hearing participants should be representative and the hearing views shall serve as an important reference for decision-making.”)
 - Accelerate the improvement of the existing environmental legal framework, management

tools and technologies in China, including amendments to major legislation like the *Law of Environmental Protection*; introduction of appropriately stringent standards; and ensuring the strict implementation and compliance. (The NPC Standing Committee carried out the assessment of the *Law of Environmental Protection* and its related laws during 2008-2010, and the NPC Environmental and Resources Protection Committee started to amend the *Law of Environmental Protection* in January 2011. Public opinions were solicited for the amendment in September 2012.)

- Take full advantage of the economic policies based on the market mechanism to promote the strategic transformation of environment and development, including environmental taxes, energy taxes, green credit, environmental insurance, ecological compensation, and emissions trading. (SAEP and CBRC jointly announced the *Opinions on Implementing Environmental Policies and Regulations and Preventing the Credit Risk* in July 2007, since when green credit policies began to take shape. Both jointly issued the *Guidance on Work Related to Environment Pollution Liability Insurance* in December 2007, launching the establishment of the environmental insurance system. In May 2010, the State Council approved and forwarded *Opinions of NDRC on Priorities in Deepening the Economic Reform in 2010* to deepen the reform of the fiscal and taxation systems, and rolled out the resource tax reform program and studied the introduction of environmental tax scheme. NDRC officially began to draft the *Regulations on Ecological Compensation* in August 2010, and the NDRC General Office issued the *Notice on Carrying out the Pilot Emission Trading Scheme* in October 2011, deciding to carry out the ETS pilot in Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong and Shenzhen.)
- Take full advantage of China's trade surplus to import energy-intensive and resource-intensive products and technologies and reduce the export of similar products. (MOF issued a notice in June 2010 to cancel the export tax rebates for 406 kinds of commodities, including steel, chemical products, and non-ferrous metal processing materials as of July 15, 2010. China remains to impose export tariffs on resource-based, energy-intensive products with high pollution, such as coal, crude oil, fertilizers, and non-ferrous metals, at the provisional tax rates in 2011 and 2012, and offer preferential tax rates for imported energy and resource products.)
- Become constructively involved in bilateral or multilateral environmental cooperation; adhere to the principle of common but differentiated responsibilities; maintain the development right of developing countries including China; and establish the responsible national image on environmental issues. (For example, in the field of climate change, China is active in each UN Climate Change Conference and takes concrete actions to show the image of a responsible big nation on environmental issues.)

2008

- Develop low-carbon economy to help tackle domestic resource constraints and to enhance international competitiveness while building a response capacity for climate change. (On September 22, 2009, in delivering his opening speech to the UN Climate Summit, President Hu Jintao announced China's commitment to a green, low-carbon and circular economy and to researching and using

climate-friendly technologies.)

- Take the opportunity of major industrial restructuring caused by the financial crisis, accelerate the transformation of economic growth mode, step up efforts in clean energy production and technological innovation, nurture and boost the clean industry and low-carbon economic development, and enhance the capacity for addressing environmental pollution and climate change. (The NPC Standing Committee formulated the *Law of Circular Economy Promotion* in August 2008, passed the *Resolution on Active Response to Climate Change* in August 2009, and modified the *Law of Renewable Energy* in December 2009 and the *Law of Cleaner Production Promotion* in February 2012.)
- Consider the introduction of low-carbon economic development goals in the 12th Five-Year Plan, and incorporate low-carbon economic development into the current strategies and actions. (According to the 12th Five-Year Plan, the energy consumption per unit of GDP should be reduced by 16% and CO₂ emissions per unit of GDP by 17% during the 12th FYP period.)
- Strengthen environmental management in rural areas and drive the overall advancement of the cause of environmental protection in China. (The State Council made the significant decision to use awards for promoting governance in the national television and telephone conference on rural environmental protection in July 2008. The General Office of the State Council forwarded on February 27, 2009 the *Implementation Program for Implementing Award for Promoting Governance and Advancing the Solution to Prominent Environmental Problems in Rural Areas* developed by MEP, MOF and NDRC, clarifying the work objectives: by 2015, the prominent environmental issues that seriously endanger the health of the masses, towns and villages will be brought under control; environmental regulatory capacity significantly strengthened; and environmental awareness significantly enhanced.)
- Establish a prevention system based health risk assessment, including a sound environmental standards system, the directory of pollutants for priority control, and a strict environmental access system for implementation. (MEP issued the *12th Five-Year Plan for Environment and Health in National Environmental Protection* in September 2011.)
- Government shall disclose environment and health information of public concern timely in government websites and news media in the form easily accessible and understandable to the public. (China has achieved significant progress in the field of environmental information disclosure since the promulgation of *Government Information Disclosure Regulations* and *Measures for Environmental Protection Information Disclosure (Trial)* in 2007.)

2009

- Carbon emission shall be significantly reduced until 2020 than 2005, try to guarantee the carbon emission per GDP is reduced by 4-5% per year and break down the objective according to different regions and industry features. (Before Copenhagen conference in December of 2009, China released its objective of emission reduction of China – until

2020, ratio of carbon dioxide per GDP in China shall be reduced by 40-45% than 2005, which shall be included in middle and long term plan of national economy and social development as a constraint index and accordingly prepare domestic statistic, monitoring and criteria for evaluation.)

- China is going through a major transformation towards human-centred and sustainable development strategies based on scientific development and harmonious approaches. China will continue to promote its strategic transformation of environment and development in order to achieve and sustain green prosperity as the basis for China's future development. (In Premier Wen's speech to United Nations Conference on Sustainable Development on June 20, 2012, he expanded on green prosperity and said: we expect a world characterized by green prosperity in the future, where there is no poverty or ignorance, no discrimination or oppression, no over extraction from nature or human-induced destruction; where we will see economic development, social equality, environmental friendliness and balanced harmony; and where the fruits of civilization will be shared by all and benefit our future generations.)
- Take green economic development as an important approach to drive ahead the transformation of economic development pattern, and advance the formulation of the national strategy for green economic development. Step up efforts to boost circular economic development and improve the efficiency of resources and environment in economic development. (The 12th Five-Year Plan, for the first time, introduces the concept of "green development" and elaborates on it in a separate chapter.)
- Pay close attention to the research and formulation of low-carbon economic development planning, covering national strategic objectives, tasks, and specific measures, and launch the pilot and demonstration in major industries, some cities and rural areas to advocate the low-carbon lifestyle. Actively explore the new road to urbanization and the development of low-carbon cities. (NDRC issued the *Notice on Conducting the Low-carbon Pilot in Provinces and Cities* in July 2010.)
- Promote building energy-efficient technologies and measures based on the energy-efficiency assessment, and develop energy-efficient, low-carbon building. (MOF and MOHURD jointly issued the *Implementation Views on Accelerating the Development of Green Building in China* in April 2012, and promulgated the *12th Five-Year Plan for Building Energy Efficiency*.)
- Identify the public transport and non-motorized transport system as one of the national priority strategic fields. (It is discussed in Section III "give priority to the development of public transport" of Chapter 12 "build a comprehensive transportation system" in the *Outline of the 12th Five-Year Plan*.)
- Implement the environmental tax reform with the appropriate environmental taxes as the core. (*Opinions on Strengthening the Work Priorities in Environmental Protection* issued by the State Council calls for "actively promoting environmental tax reform and studying the introduction of environmental taxes.")
- Improve and strengthen the green credit policy, and give full play to the important role of financial institutions in energy conservation and environmental protection. (CBRC developed the *Green Credit Guideline* in February 2012, specifying the practices of banking institutions in green credit.)

- Establish and improve laws, regulations and policies about environmental pollution liability insurance. (*Opinions on Strengthening the Work Priorities in Environmental Protection* issued by the State Council calls for “improving the environmental pollution liability insurance system and carrying out the pilot of mandatory environmental liability insurance.” *The 12th Five-Year Plan for National Environmental Protection* proposes “establishing a sound environmental pollution liability insurance system and studying the compulsory insurance system for high environmental risk enterprises, such as enterprises with heavy metal emissions.” MEP has also rolled out supporting technical specifications for environmental pollution liability insurance. Following the measures for environmental risk grading of chlor-alkali enterprises, MEP issued the *Environmental Risk Assessment Guide – Measures for Environment Risk Grading of Sulfuric Acid Enterprises (Trial)*, *Opinions on the Identification and Assessment of Environmental Pollution Damages* and *Recommended Methods for Calculating Environmental Pollution Damages (Edition I)*.)
- Develop the *12th Five-Year Plan for National Green Economic and Social Development*. (*The Outline of the 12th Five-Year Plan* adopted by NPC in March 2011 identifies seven binding targets for resources and environment. It is known as the most “green” five-year plan since the founding of the new China.)

2010

- Vigorously strengthen ecological protection and restoration, and respite important terrestrial ecosystems and aquatic ecosystems. (In September 2010, MEP released *China’s Biodiversity Conservation Strategy and Action Plan (2011-2030)*. In December 2010, the State Council issued the National Planning for Main Function Zones dividing the national space into areas for optimized development, priority development, restricted development and prohibited development. Among the restricted development zones are key ecological function zones. Prohibited development areas refer to different natural and cultural resource reserves established at all levels by law, and key ecological function zones prohibited from development for industrialization and urbanization and in need of special protection. *The Outline of the 12th Five-Year Plan of the People’s Republic of China for National Economic and Social Development* adopted by the NPC in March 2011 states in Chapter 25 “promote ecological protection and restoration”, that we shall insist on the protection first and the priority of natural repair, enhance efforts in ecological protection and construction, and reverse the trend of ecological deterioration from the source.)
- Comprehensively promote soil environmental protection for public health and ecological environment safety. (“Strengthening the soil environmental protection” is discussed in Part IV “effectively solve outstanding environmental issues” of the *12th Five-Year Plan for National Environmental Protection*.)
- Speed up the legislative process for ecological compensation, and improve relevant policies and mechanisms. (China is currently developing the *Regulations for Ecological Compensation*.)

2011

- Establish a performance evaluation system favorable to the green transformation of development mode for leading cadres. (*The 12th Five-Year Plan for Energy Saving and Emission Reduction* issued by the State Council in August 2012 clearly states that each year the State Council will conduct the evaluation and examination of energy saving and emission reduction targets to provincial people's governments, and the evaluation results will be an important component in the comprehensive assessment of the leading bodies and leading cadres, and be included in government performance management for the accountability system.)
- Drive the ecological adjustment of the fiscal and financial policies on all fronts, advance the carbon tax pilot, and set up an ETS platform. (NDRC General Office issued the *Notice on Carrying out the Pilot Emission Trading Scheme* in October 2011, deciding to carry out the ETS pilot in Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong and Shenzhen. To regulate project-based voluntary emission trading activities, NDRC issued the *Interim Measures for Voluntary Greenhouse Gas Emissions Trading* in June 2012.)
- Develop the low-carbon industrialized development planning, and set carbon intensity reduction targets for heavy and chemical industries. (*The 12th Five-Year Plan for Energy Saving and Emission Reduction* issued by the State Council in August 2012 sets energy-saving targets in various sectors, including the industrial sector during the 12th FYP period.)
- Promote the eco-friendly FDI strategy for green transformation. (Revised *Catalogue for the Guidance of Foreign Investment Industries* in December 2011 further encourages foreign investment in the field of energy conservation and environmental protection.)
- Establish and improve the green supply chain system, and drive the green transformation of the entire production system through green consumption and green market. (In government procurement, the *12th Five-Year Plan for Environmental Protection* calls for a progressive increase in the proportion of environmentally friendly products in green procurement, and the research and implementation of government procurement of environmental services, with a comprehensive directory for environmental protection. And the *12th Five-Year Plan for the Development of National Strategic Emerging Industries* released in July 2012 puts forward "vigorously promoting environmental labeling products and the government green procurement system, and actively promoting green consumption." MOF announced the adjusted 11th and 12th lists of energy-saving products for government procurement, and the 9th and 10th lists of environmental labeling products for government procurement in January and July 2012 respectively. MOF also requested improving the priority procurement and mandatory procurement system for energy-efficient and environment-friendly products in May 2012. In private consumption, the Chinese Government continues to allocate subsidies in an effort to promote the consumption of energy-efficient products.)
- Enhance technical support and environmental risk control and supervision, and

strengthen pollution reduction in mercury-related industries. (*The 12th Five-Year Plan for the Nonferrous Metal Industry* released by MIIT in December 2011 proposes only retaining the native mercury smelting enterprise Shaanxi Mercury and Antimony Technology Co., Ltd. at the end of the 12th Five-Year Plan period, and outlawing others. Mercury catalyst recycling enterprises should have mercury vapor recovery units, and the establishment of new mercury catalyst recycling business should be under strict control across the country, except in Wanshan of Guizhou.)

V. Conclusion

Looking back over the past five years, China has made tremendous economic achievements, with an increase rate of 11.2%, in spite of various natural disasters, the financial crisis and the debt crisis. Signs have shown that the economic growth slows down in the 12th FYP period. Looking forward to the next five years, or even the next one or two decades, China will face challenges in the transformation of economic development pattern and the economic growth rate, but will also be confronted with resources and environmental constraints.

Ranking as the second largest country in terms of total GDP, China has become an import power in the world economy. As well, China is among the largest emitters of pollutants and especially is the largest CO₂ emitter, which implies that China is playing a critical role in solving the key global environmental problems. The unveiled 12th FYP stirs great international concern over China's development prospects in the next 5 to 10 ten years, or even longer.

According to an Asian Development Bank (ADB) report² in 2012, notwithstanding the economic achievements in the 11th FYP period, China continues to face significant challenges under four large-scale drivers: 1) rapid economic growth, 2) irrational economic structure, 3) quick urbanization, and 4) high energy consumption and low energy efficiency. A World Bank report released in 2012 analyzes the opportunities and challenges for the green development in China and makes appropriate recommendations.³ It reads that China shall seize the opportunity to “go green” given China's many advantages — its large market size that will allow rapid scaling up of successful technologies to achieve economies of scale and reduced unit costs; a high investment rate that will permit rapid replacement of old, inefficient,

² Toward an Environmentally Sustainable Future: Country Environmental Analysis of the People's Republic of China

³ China 2030: Building a Modern, Harmonious, and Creative High-Income Society

and environmentally damaging capital stock; its growing and dynamic private sector that will respond to new signals from government, provided it gets access to adequate levels of finance; and a relatively well-developed research and development infrastructure that can be harnessed to reach and then expand the “green” technology frontier. In the implementation of a green development strategy, many obstacles and difficulties also need to be overcome. Most important among these is the price of energy, water, raw materials, and natural resources, which remain distorted to different degrees and do not reflect either the negative externalities associated with their use or their true scarcity value. The result is high resource intensity in production and associated wastage and pollution. A second and related obstacle is excessive dependence on administrative mechanisms to deal with environmental and natural resource management issues. At the same time, other fiscal and regulatory incentives for environmental protection are either weak or weakly enforced. A green development strategy will also face implementation and incentive constraints within government, and may face opposition from workers and enterprises that benefit from the current pattern of growth, exports, and investment. The observations from the international agencies indicate that an unprecedented human experiment is expanding in China with unique opportunities and various constraints. China has entered into deep waters of reform, which means a substantial step is needed in the support of courage of institutional innovations. The success of China will be a new miracle in human history and serve as a demonstration for other countries to race to a green and prosperous economy.

CCICED has made magnificent contributions with its suggestions and recommendations in the field of environment and development in the last 20 years. As a top advisory body for the Chinese Government, CCICED clearly understands that the greater the difficulties and challenges faced by China’s development, the more considerable the responsibility it bears in terms of contributions and achievements. Constant efforts and continued innovation are necessary for the new CCICED Council to maintain its vitality and make new contributions to the environment and development in China.

2012 is the second year of the 12th FYP period. In order to achieve the objective of “accelerated transformation of economic development mode”, the Chinese Government issued a series of policies in 2012 to raise the level of ecological civilization; earnestly solve prominent environmental issues that affect the scientific development and harm public health; strengthen institutional innovation and capacity construction; and reduce the total emissions of major pollutants in an effort to improve the environmental quality, prevent environmental risks, and comprehensively

promote the historic transformation in environmental protection. China began to attach more attention to the balance between economic development and environmental protection, between urban environmental protection and rural environmental protection, and between pollution prevention and ecological protection. It is also concerned about the prevention and resolution of environmental problems at the macro level and from the source, and is focusing on green economic policies for solutions to environmental problems. China strives to play a constructive role in international environmental cooperation.

In the review of the environment and development policies of the Chinese Government last year, special attention should be attached to the following important signs of policy development.

First, it was put forward that the basic environment quality, being at a level not harmful to public health, belongs to public goods, and is therefore a basic public service provided by the Government. In Chapter VI of the *12th Five-Year Plan* it calls for an improved basic public service system for environmental protection to safeguard regional urban and rural balanced development. It clarifies that environmental goods are public property and fall into the government responsibilities for provision, so that all citizens, regardless of geographic, ethnic, gender, income and status differences, can receive basic environmental public services that are compatible in the level of economic and social development and roughly equal in the final results. Vice Premier Li Keqiang emphasized this point again at the 7th National Conference on Environmental Protection. This indicates that the Chinese Government has linked the quality of the environment with the fundamental rights of the citizens, further upgrading the importance and legitimacy of environmental protection.

Second, for the first time the prevention of environmental risks is included in the *12th Five-Year Plan* as an important task. Efforts shall be made to set up a basic risk assessment and warning and management systems to facilitate the whole-process technical management, and to introduce technological policies, standards, and engineering specifications for more relevant and targeted environmental risk prevention. Identify high incidence areas and industries sensitive to environmental risks in China; attach more attention to the impact of trace toxic and hazardous substances; and extend environmental management to production and domestic life for all-round prevention and control. With full consideration of human health factors, bring nuclear and radiation, heavy metals, persistent organic pollutants, soil pollution, and hazardous waste and chemicals under priority prevention and control, in order to lay the foundation for the full control in the 13th FYP period or longer. This suggests

that China's environmental protection work in these five years will be increasingly dependent on source control to avoid more severe harm to the environment and the public from end treatment, through comprehensive and effective protection against environmental risks.

Third, public participation in environmental protection has reached a new level. Last year, events such as the public promotion in the PM2.5 control, universal energy efficiency program, and environmental groups exposing the pollution problems of famous multinational suppliers reflected how the public is playing an increasingly important role in the Government environmental decision-making, practicing the eco-friendly lifestyle, and supervising the corporate performance in environmental protection. As mentioned in CCICED's policy recommendations in 2011, the green transformation of development mode is related not just to policy, institutional and technical issues, but also to social and cultural values. Environmental protection takes up the mission to improve people's livelihood and optimize economic development, but also shoulders the significant historical responsibility of reconstructing social and environmental ethics. We should vigorously promote ecological civilization, advocate the environmental culture, respect the natural and objective laws of social development, inherit and carry forward the excellent traditional Chinese culture, and build a favorable social morality, responsibility, integrity and environmental ethics system in order to shape powerful ideological and spiritual support for the green transformation of development mode. Public practice in environmental protection in China last year proves that more and more of the public has recognized the concept of ecological civilization and come forward to safeguard the public interest.

Fourth, ecological civilization construction calls for a further revision of *Law of Environmental Protection*. Although the amendment has made huge progress, such 'limited modifications' still lag behind the expectations of the people. In the 30 years of economic development, the conflicts between the environment and the economic development have been open, and the complex competing interests involved in the revision between the central and local governments; between relevant departments; between enterprises and regulators and administrators; and between the public, Government and businesses causes both difficulties to the amendment and constraints to breakthroughs. It is due to such conflicts that this amendment is aimed at limited modifications that do not touch the expected environmental interests, public interest litigation, more severe penalties for violations, as well as the planning and policy EIA. It strengthened the corporate environmental responsibility, but no breakthroughs were made in the information disclosure and reporting system, which is of certain binding force to enterprises. In order to construct a higher level of ecological civilization and a

beautiful China as required by 18th CPC National Congress, the revision of Environmental Protection law shoulders a historic mission to make institutional innovation to ensure the achievements of those goals. It is foreseeable that the revision of Environmental Protection Law, in response to the requirement of 18th CPC National Congress, will emancipate the mind, innovate institutions and break through institutional obstacles, making a real basic law to guide environmental protection.

2012 is an important nexus year for the implementation of the *12th Five-Year Plan* when the CCP will hold the remarkable 18th National Congress. As the tasks have not been completed in 2011, China will face even greater pressure in the work to save energy and reduce emissions in 2012. However, we believe that, with the introduction of favorable policies, the green transformation of economic development mode will be accelerated and achieved step by step. As Premier Wen Jiabao highlighted in the *Government Work Report 2012*: “We must use actions to announce to the world that China will never seek for economic growth at the expense of the ecological environment and the health of its people. We will be able to embark on the green development for production growth, affluent life, and ecological civilization.”

Part 2. Appendix: Policy Recommendations to the Government of China in 2011(Abstract)

The Annual General Meeting (AGM) of the China Council for International Cooperation on Environment and Development (CCICED) was held November 14-17, 2011 in Beijing. The theme of the AGM was “Green Transformation of Economic Development Pattern.”

CCICED members have noted that China’s commitment to all-round transformation of development pattern and a green development road were once again demonstrated during the recently concluded 6th Plenary Session of the 17th Party Congress, as well as in the *Opinions on Strengthening Key Environmental Protection Work* just issued by the State Council. The Opinions document stressed that “reform and innovation shall be the new driving force for exploring the new path of environmental protection featuring low cost, good returns, low emission and sustainability”. The Session and the Opinions are important demonstrations of China’s continued national will to strengthen environmental protection. Cultural development should also be part of the green transformation efforts. Promoting an environmental culture and ecological civilization in this process will help to build environmental ethics in China. To be fully successful, this effort must be linked to a strategy for sustainable livelihoods, and new, more environmentally friendly strategies for economic growth.

CCICED established three task forces linked to the green transformation theme: research on the development mechanism and policy innovation of China’s green economy; low carbon industrialization strategy in China; and trade, investment and environment, focusing on FDI entering China and ODI on the part of China. The Council also carried out special policy studies on greening China’s supply chains, and on mercury management in China. The goal for all of these studies is to contribute to the roadmap for transformative green development in China.

Based upon the research results of these studies and discussions during the AGM, CCICED proposes five policy recommendations to the Government of China.

RECOMMENDATION 1. Rebuild social values, adjust government roles, and cultivate human resources to reinforce and serve an unswerving national will on green transformation of development mode.

1. Establish a long-term and unswerving national will on the green transformation of development mode.

Although under the severe challenges of the current international economic slowdown, financial market instability, debt crisis, and slow growth, the Government of China should not weaken environmental controls, or lower environmental targets and standards to yield to the economic pressures. It is crucial for the national government to step up its guidance and supervision of local governments, especially those that may be inclined to ignore green transformation in favor of strong economic growth. Reversals of this sort may be common. Therefore green transformation will require unswerving national commitment and determination.

2. Incorporate the concept of Ecological Civilization into overall social and cultural development and reward sound social values and environmental ethics.

Greater efforts should be made to promote ecological civilization and environmental culture, abide by rules of ecology and of social development, and, as appropriate, draw upon traditional Chinese values and ethics. Environmental values need to become part of an overall ethical system. Such a system will help provide strong moral and spiritual support to the green transformation of China's economic development pattern.

3. Reform government functions, strengthen its management of public goods and social service functions for green development.

China's economic system has been progressing, but the government has been relatively slow in adjusting itself to societal needs in a market-based economy. What's more, the global financial crisis to some extent has provided more room for governmental interventions in the economy. During the post crisis period, it is a pressing concern for the Chinese economy to shift from overdependence on policy incentives towards a more spontaneous growth pattern. The boundaries of government's role should be identified more clearly, and its public service role strengthened.

4. Build a better performance evaluation system and mechanisms that strengthen accountability of government officials for green transformation of development mode.

The performance evaluation system from the Central Government down to the local levels therefore should undergo comprehensive reform. The system should focus not only on achieving economic growth targets, but also on the manner, pattern and quality of development. This requires assessment of the relationship between

economic growth and social progress, with better indicators for the quality of economic growth, environmental protection, resource efficiency and green employment. In cases where economic growth is so rapid that the environment is not being properly protected, there should be a negative assessment of performance. Monitoring, reporting and verification (MRV) for domestic environmental regulation is still not adequate enough, especially at regional and local levels. An evaluation and indicator system for green economy development should be established, backstopped by an improved system of national accounts modified to consider environmental statistics. Green GDP is a fundamental reform of the national economic accounting system for which the Central Government should continuously support relevant research and expedite its application.

5. Recognize and strengthen the critical role of enterprises in green transformation, and encourage self-motivated action.

In response to the importance of civil society in green transformation, implement environmental information disclosure practices, environmental auditing and reward mechanisms as part of the effort to put into practice Corporate Social Responsibility (CSR) and to enhance transparency towards environmental improvement efforts. Government should provide a favorable regulatory framework to facilitate enterprises' green transformation and encourage active participation in international cooperation, through which their CSR, green image and sustainable competitiveness can be enhanced.

6. Establish a human resources development system that supports green development.

Knowledgeable and motivated people are the most important factor, and a basic prerequisite for green transformation of the development pattern. A wide range of scientific outlook and green-minded talents should be incorporated into the priorities of national middle- to long-term plans for China's human resources development.

RECOMMENDATION 2. Establish China's green economy system and advance green transformation of the existing economic development mode.

1. Set strategic targets and create an overall framework for green economy in China.

A preliminary green economic system that includes green manufacturing, green

consumption, green trade and investment could be well established in China within the next 10-15 years.

The overall framework for this green economic system should give full play to the role of environmental protection in optimizing economic growth. The framework should highlight two main strategies, transformation and innovation, and six main sectors. The strategy of transformation is two-fold: economic development mode and governance structure need to be transformed; and innovation emphasizes institutional, structural, and technological shifts. The six sectors include: emerging new strategic industries, green transformation of industry, agriculture and the service sector, low-carbon and ecological restoration, green consumption pattern, and a more balanced approach to regional development.

2. Implement “customized” and balanced green development strategies in different regions of the country.

Since the regions of China vary in phase and mode of development, this regional disparity means that there is no general shortcut to a sustainable development path, and therefore a single set of standards should not be applied to all regions. To give full play to the characteristics and potentials of each region in developing its green economy, it is first necessary to have a good understanding of the context of green economy within a region, the particular challenges and opportunities, and the region’s capacity to coordinate national and local policies, as well as a sense of optimal integration of regulations with market mechanisms.

(1) Based on each region’s comparative advantages and key characteristics, promote specific regional green development and prevent pollution migration and unsustainable resource and environmental uses. Prevent the transfer of outdated technology, equipment and pollution from developed to undeveloped regions.

“Customized” green development strategies for different regions should be formulated to take advantage of their respective potentials. For the eastern region, the development of industrial clustering, research and innovation, and environmental and financial services should be encouraged. The mid-western region, considering its advantages in infrastructure and human resources, should become a new manufacturing centre, as industry relocates from the eastern region. For the western region, which boasts a large workforce, vast land and rich natural resources, the development of sustainable mining, equipment manufacturing and new energy is appropriate, but needs to take into account significant but often fragile ecological systems and functions.

(2) Stick to green and balanced development between urban and surrounding rural areas; promote green, efficient and centralized urbanization in line with regional development needs. Land allocation should be given to those projects with the highest added-value and ecological service capacity and with land resource value taken into account. Promote the green transformation of resource-depleting cities by establishing

a new mechanism to subsidize their green transformation, and by providing direct and sufficient compensation for resources exploitation. Much of the emphasis should be on conservation planning and practices—for land, water and other natural resources and ecosystem services.

3. Prioritize strategic emerging industry sectors and focus on the greening of all three traditional industries to promote green economy.

(1) Adopt a coordinated and integrated approach to push forward green transformation of conventional industries. Green transformation of conventional industries requires multiple solutions for multiple challenges. The exit mechanism for heavily polluting enterprises needs to be improved. Compliant enterprises should be encouraged to take the initiative of green transformation and spontaneously phase out outdated and polluting equipment and technology. Relevant special funds should be set in place, such as a central incentive fund for phasing out backward, low productivity enterprises; a special subsidy for smaller enterprises that must be shut down; and possibly, a special fund to assist with major pollutants reduction. Financial support should be provided to dirty enterprises that take action to meet relevant environmental standards. Technological upgrading can be encouraged by preferential tax, land and credit policies. Punitive measures should be imposed for non-compliant, to-be-phased-out dirty enterprises; such measures might include higher power and water prices, suspension of new loans or withdrawal of already granted loans.

There should be further strengthening of mandatory measures of energy saving and pollution reduction, improvement of laws and regulations concerning energy technology and standards, and new combinations of pollution treatment and resource efficiency measures to realize synergies between energy saving and pollution reduction.

(2) Promote green restructuring in the agricultural sector and link this action to food and agro-products security and rural sustainability. There is an urgent need to strengthen non-point pollution prevention and treatment and to promote comprehensive environmental improvement programs, including waste treatment in rural areas.

The government should cancel its subsidies for chemical fertilizer production and guide their rational production and use. At the same time, large-scale production of organic fertilizers should be supported, and subsidies for the substitution of chemical fertilizers with organic ones, where feasible, should be increased.

The surge in animal husbandry deserves particular attention. Some segments of the market require consolidation into holdings of a size where proper waste treatment can take place. Current subsidy patterns require examination to determine how they may be improved or removed in order to create sustainable animal husbandry, including aquaculture. Biomass waste from agricultural crops is not being properly utilized and more effort is needed to turn a greater portion of the waste into new products, such as second generation biofuels. It is also recommended that forest management and other land and water uses be developed as ecological enterprises for services like carbon sinks.

(3) Develop green service sectors and improve green employment opportunities. China should accelerate the development of green financing, green logistics and the environmental service sector. In addition, China should strengthen regulation and guidance on the greening of traditional service sector activities, promote the reallocation of capital and investment, and create more jobs in the service sector.

(4) Promote sustainable consumption and champion green economic development. Sustainable consumption is a driving force for green economy. As people's income increases in China, the end link of sustainable consumption will be a key factor for the success of green transition. It is also an important and useful approach to advocate that good quality of life does not require the consumption of large amounts of commodities. The establishment of a new sustainable consumption pattern entails lifestyle changes and a social attitude of sustainability. In this process, the government needs to be the first to take action. Green government procurement can be a good reference point for safe, rational and frugal consumption. At the social level, a product life cycle approach that conserves resources and reduces pollution should be established. Such a system will help foster green consumption behavior across the whole society. At the corporate level, green supply chains need to be introduced widely. Market mechanisms such as sustainability certification should be utilized to promote sustainable production and consumption.

4. Establish the legal, regulatory and policy system for green economy development.

(1) Establish a supportive legal framework for green economic development. Many changes in the legal system are needed to better promote the development of green economy and to help harmonize environmental laws, regulations and institutional arrangements with other elements of the legal systems, which will strengthen overall legal protection of environmental resources. This includes: civil and commercial law, administrative law, economic law, social law, litigation law and criminal law.

The revision of the Environmental Protection Law provides a good opportunity to strengthen the responsibility of the government, with an emphasis on drafting relevant laws that clarify responsibilities concerning the regulation of environment matters at each level of the government. The civil liability of environmental damage should be strengthened, and research should be carried out on drafting laws regarding compensation for environmental pollution and damage, in order to better protect public environmental rights and interests, especially with regard to health, safety and a clean environment.

The environmental liability of enterprises also requires better legal definition. As long as it is cheaper to damage the environment than to pay for its maintenance, or to

receive only minor fines in case of violations of laws and regulations, then enterprises are unlikely to conform. Furthermore, strict environmental liability will require much more in the way of guarantees for environmental restoration and higher payments to cover health or other damages to people and communities.

The government should move faster in developing and revising relevant laws and regulations that help promote carbon reduction; for instance, in the fields of energy generation and transfer, energy efficiency, resource saving and consumption. Climate change related laws need to be listed on the legislation agenda; the Energy Law should be developed and promulgated as soon as possible; and amendments should be made to the Coal Law, Electricity Law, Energy Saving Law and Renewable Energy Law, etc., in order to further encourage the development and consumption of clean and low-carbon energy. China should make revisions to a number of laws regarding natural resource use, including the Agricultural Law, Forest Law, Grassland Law, and Land Management Law, as well as integrated water management and various aspects related to sustainable use of the oceans.

All these laws will require administrative regulations and rules to help maintain and sometimes increase the productivity of land, water and sea, as well as the carbon sink function of agro-forest ecosystems. In addition, there is a need to revise protection and development plans for forest, farmland and grassland; to more strictly control cultivation in ecologically fragile regions and habitat important for biodiversity protection; and to forbid destruction of natural forest, grassland and farmland, and critical aquatic and marine habitats under any excuse.

The newly emerging industries in fields such as biotechnology and information technology present additional challenges, since some of their environmental impacts and benefits will require regulatory frameworks and possibly enabling legislation.

(2) Establish a comprehensive evaluation system of government policies. Rather than relying mainly on stand-alone decisions, there should be strengthened coordination among related activities, sometimes requiring cumulative impact assessments and greater use of assessments in the context of integrated regional development, river basin management, regional transportation strategies, etc. A comprehensive evaluation system should be set up for major policies or projects concerning energy efficiency and pollution reduction. When the government develops and implements major policies, projects, or makes major direct investments, the whole process from decision making to implementation should be checked for

anticipated and actual results, bearing in mind the overall goal of promoting green economy.

(3) Implement green fiscal reform, including environmental taxes such as a carbon tax, and implement financial policies designed to improve market-based approaches and establish emissions trading platforms. The leading role of the government should be strengthened in fiscal, taxation, financial and pricing policies. The key need for fiscal and taxation policy reform is to provide an incentive framework that encourages green investment, green trade and green production. This reform will become a major driving force for accelerating green transformation. In the short and medium term there should be a steady increase in fiscal support for green economic initiatives, with a comprehensive set of policies for designated funds, subsidies, rewards, discount charges and guarantees. The government budget should be leveraged to maximize its benefit and establish a joint investment mechanism between the central and local governments. A tax system to promote green development should include accelerating resource tax reform, adjusting consumption tax in light of energy and environmental policies, and introducing environmental tax (carbon tax included). The consumer tax should be adjusted to include high energy-consuming, high emission products. It is also recommended to increase the tax on petroleum and other high energy-consuming products and to provide tax breaks for those certified energy-saving products.

Financial policies can also be improved by introducing relevant credit policy and financial instruments to encourage investment and innovation in energy and environmental areas. Reform of the resource pricing system should fully reflect resource scarcity and environmental costs. Pricing reforms of key resources and products, such as water, electricity, coal, oil and natural gas should be deepened. The existing cross-subsidization policies should be reformed to protect socially vulnerable groups and to provide direct subsidy to these groups using national funds. Market-based instruments should be fully explored and introduced in emission reduction and energy conservation. Markets and exchanges for emissions trading, including both carbon dioxide and conventional pollutants, should be established to facilitate its implementation, with pilots being carried out as early as possible.

5. Promote green innovation.

Promote green innovation including the establishment of a “green innovation” strategy mainly based on fundamental research, technological R&D, and human resources development. Green innovation strategy should bridge the connection

between fundamental research and commercialization. Green innovation should also be achieved through institutional reform and by use of new environmental policy instruments, such as standards, green procurement and innovation reward systems. Green innovation should be more open to international cooperation and provide support for technology transfer for small- and medium-sized enterprises, and for public-private partnerships through the creation of an international green innovation and investment platform.

6. Enhance international cooperation on green economy.

It is beneficial for China to carry out international cooperation on green economy. This can be done within China and abroad by engaging in green improvements related to economic globalization; by drawing upon advanced ideas and experience of the international community on green economy; and, in cooperation with partner countries, by promoting exchanges and transfer of know-how, information and technology, and capacity building.

RECOMMENDATION 3. Build a low carbon industrial system that champions and supports green transformation of economic development mode.

1. Map out a development plan for low carbon industrialization in China with carbon intensity targets set for main heavy industrial sectors.

There is a need to establish a low carbon industrialization plan, to coordinate this plan with other plans, and to develop a comprehensive development strategy for low carbon industrialization. Sectorial carbon reduction targets should be set up for heavy and chemical industries like power, iron and steel, chemicals, construction materials and non-ferrous metals, to take full advantage of the autonomy and motivation of respective sectors in setting up sector-based policies and develop R&D capacity.

2. Increase support for emerging strategic industries, the driving force for low carbon transformation.

The development of strategic emerging industries is a driving force for green and low carbon industrial transformation. The government should further lower the access hurdles and create a more favorable business environment for strategic emerging industries. The development plans for the seven main strategic emerging industries should be drafted, issued and implemented as soon as possible. A special fund supporting the development of strategic emerging industries should be established. In the emerging industry parks, the central and local governments should provide

support to the infrastructure construction, certain key projects, R&D, public service platform and innovation capacity building. Tax and financial tools should be adopted to accelerate commercialization of strategic emerging industries. The government could also consider the joint-stock approach, set up capital and equity investment funds, and encourage more investment in innovative but early-to-middle-stage companies of strategic emerging industries. Moreover, the government should develop relevant policies to encourage private and foreign investment in these industries.

In areas and sectors where pilot initiatives are being carried out, priority should be given to ensuring that prices for electricity, energy, and products are allowed to fully reflect the impact of trading or green taxes. It is also important that they are underpinned by carefully regulated data systems, and in relation to the development plan for low-carbon industrialization. Particular attention should be paid to the coordination of sectorial initiatives with cross-sectorial policies and programs. This will ensure synergies, and avoid duplication or offsetting effects.

3. Promote technological innovation and application to support low carbon transformation.

More support should be given to low carbon research, and its weight in the total R&D budget should be increased. In line with the development trend towards low carbon industries, there should be greater effort to make technological breakthroughs in the fields of carbon capture and sequestration, alternative energy and other technologies, 3R (reduce, reuse and recycle), energy and biological technology, new materials, ecological restoration, and multi-pollutant control technologies. China should set up a world-class national energy lab and support basic and generic research, with open access to enterprises, universities and other research institutions. It is important to develop a new innovation system where enterprises play a leading role. The governmental funds for science and technology should increase their support to enterprises so as to attract more investment from all sectors. More efforts should be made to protect related IPRs. A cross-sector technological union should be formed to promote industrial integration and innovation. Meanwhile, international cooperation should be strengthened on low carbon technological innovation in order to make good use of international resources and position China to take advantage of international innovation related to low carbon technology.

4. Improve the regulatory and voluntary standard system for low carbon production and products.

First, amend energy efficiency standards of buildings, transportation equipment, major industrial equipment, and main energy consuming items like household appliances and lighting products. Second, improve energy-efficient label management and accreditation; expand the scope of mandatory energy labeling; explore how to introduce “carbon footprint labels” in a phased manner; carry out low carbon product accreditation; and guide consumption behavior to become ‘lower carbon’. Third, strictly implement energy efficiency standards and raise access of energy intensive sectors, and carry out carbon-reduction assessment for new and expansion/rehabilitation industrial projects and for energy efficiency evaluation of new public buildings and commercial housing upon completion. For those projects and buildings that do not meet mandatory standards, project completion approval should be suspended so as to control emissions from the source. Establish energy efficiency monitoring and verification processes and certification policies. Fourth, enhance monitoring, indicator and evaluation systems of energy saving and pollution reduction, strengthen accountability of energy saving targets, and improve incentive-disincentive mechanisms.

RECOMMENDATION 4. Develop a green trade and investment system, establish green supply chains, and champion a goal-oriented green transformative strategy for China’s trade and investment.

1. Promote an environment-friendly strategy for improving foreign direct investment (FDI) in ways that better serve green transformation in China.

China’s foreign investment policy should be adjusted and improved to encourage more FDI in strategic fields, such as high-tech, environmental protection and other strategic emerging industries. China should implement the *Decision on Accelerating the Development of Strategic Emerging Industries* promulgated by the State Council in October 2010 in order to attract more FDI in middle and western regions and inland cities in an orderly and sustainable manner. The current *Catalogue of Industrial Guidance for Foreign Investment* should be updated to encourage green investment in China. By drawing upon the advanced experiences of FDI source countries, especially those with high environmental standards, the FDI legal framework of China could be further amended and improved.

2. Promote sustainable outbound direct investment (ODI) and share the fruits of green development.

China should make good use of the China-Africa Summit, China-ASEAN Summit and

other mechanisms to carry out policy dialogue and cooperation on sustainable investment, and strengthen sustainability and security of Chinese investment in foreign countries. A complete evaluation and supervision system should be set up so that the government can keep an eye on the operations of enterprises that invest overseas, including both state-owned and Chinese private enterprises of all sizes and types. China should promote capacity building for sustainable investment and strengthen mutual trust between Chinese investors and the public and private institutions, civil organizations and the people in recipient countries. A new Guideline on Corporate Social Responsibility (CSR) should be introduced to make the Chinese CSR standards consistent with internationally recognized ones. Chinese and foreign companies should report their performance openly and transparently using approaches such as the *UN Global Compact Communication on Progress*, or the *Global Reporting Initiative* reporting guidelines.

Together with the host country, China should also create the Sustainable Development Funding financial instruments to mitigate the impact of China's natural resource procurement activities, particularly when they result in the depletion of non-renewable mineral, oil and gas, natural forest, and other biological resources, either domestically or abroad. There are a number of such funds in the world, some of which have served to offer alternative development options to the populations affected by these extractive activities. Others have created a savings account instrument to be used by future generations, when these resources will have been depleted. Such funds must be structured jointly between the host state, its local community, and the investor with strong stakeholder participation. They can be capitalized through payment of royalties levied on the resources that are being explored and should be managed by third-party professionals as independent trust accounts, which must be accountable to the public and other related stakeholders, not just to the host government.

3. Promote sustainable development of green trade and investment through greater participation in international rules setting.

China should expand the import of sustainably produced products, and cut tariffs to encourage the import of energy intensive products, while reducing domestic production of such products so as to support industrial upgrading. The government should provide guidance and incentives to stimulate the export of products with low energy consumption and environmental damage so that the country's export mix can be greener. Export tax rebates on dirty products (energy intensive, heavily polluting and resource guzzling) should be abolished, and an additional export tax should be imposed on such products. These policies should be consistent and not affected by economic and trade fluctuations to ensure effective implementation.

China should play a more active role in the setting of green rules for international, regional and bilateral trade and investment, and in this way will help realize green transformation of itself and the world at large. China should promote the implementation at home and abroad of international environmental agreements that China has signed, and work to include environmental and social clauses in bilateral and regional investment and trade agreements currently under negotiation. China should also encourage enterprises and research institutes to carry out studies on international best practices and their dissemination, and promote ‘south-south-north’ cooperation under current international frameworks.

4. Set up and improve green supply chains in China and support green transformation of the whole production system by promoting green consumption and fostering green market.

The government can play an enabling role in the development and management of green supply chains. Green government procurement action should be strengthened and made more prominent, especially at local levels via the Government Procurement Law. A government procurement platform should be created, quotas for green procurement should be introduced and general guidelines on green government procurement should be developed based on proper green certification of products. An environmental information network of the products procured by the government should be developed and publicized. Green procurement should take place at all levels of government and in public institutions such as universities and hospitals.

China should develop a Regulation on Green Supply Chain Management and Sector Evaluation Standards of Green Supply Chain, and develop an accreditation system for green supply chains based in part on existing environmental accreditation processes. Meanwhile, ‘promotion centers’ of green supply chain should be established to strengthen collaboration among industries, the government, NGOs and other external groups.

RECOMMENDATION 5. Develop a strategy and national action plan for managing mercury use in China in order to reduce impacts on public health and the environment.

1. Develop a national strategy and action plan on mercury management.

The national strategy and action plan on mercury management should aim to reduce health and environmental damage by mercury and cut China’s contribution to

global mercury emissions. The strategy and action plan should be in line with the *12th Five-Year Plan on Comprehensive Prevention and Treatment of Heavy Metals Pollution (2011-2015)*, and identify short- and long-term mercury reduction targets for the period of 2011-2015 and beyond. Effective measures should be taken to reduce and prevent negative impacts of mercury on human health and the environment. A mandatory, facility-based and publicly accessible inventory of mercury releases and transfers should be developed to support decision making by the government, the relevant industries and communities. The strategy and action plan should be integrated into the strategies of other sectors, helping to improve environmental performance of mercury related industries and communities, and promoting clean production and realize green transformation.

2. Strengthen technical support, risk control, environmental supervision and pollution reduction of mercury related industries.

China should strengthen its legal and regulatory system for mercury management, strengthen its capacity for the enforcement of relevant laws, and carry out priority-based management of mercury with effective implementation across the country. Market-based instruments should be used as important supplements to mandatory measures and targets for reducing releases and uses of mercury and improving the management of mercury-containing waste. Scientific and technological needs should be identified to help the government make informed decisions on mercury risk control. China should promote structural adjustment of mercury related industries and communities by developing strategies with the relevant sectors to ensure that the restructuring harmonizes with market demand, urban and rural layout, regional characteristics and other essential factors. More weight should be given to a structural approach to reducing pollution (i.e., through industrial restructuring) while continuing projects to reduce and manage pollution (i.e., reducing pollution through specific treatment projects and improved management).

In order to reduce mercury emissions, mercury use should be forbidden or severely restricted in the relevant industries such as chemicals (including the production of PVC plastic), lighting, battery, medical care and pharmaceuticals. Clean production techniques and technology should be promoted and pilot programs launched to explore the best feasible technologies and environmental management practices. Where appropriate, mercury pollution prevention and treatment technologies from abroad should be introduced and commercialized within China. There is a need to support research and development of low-mercury and mercury-free alternative products and processes, gradually reaching the goal of

low-mercury and mercury-free industries and realizing mercury control at the source.

Measures that should be taken to protect Chinese citizens from possible exposure to mercury include: strengthening of occupational health and safety procedures for workers; rigorous management of contaminated sites, hazardous wastes and mine tailings; enhanced monitoring for mercury in selected foods; and the provision of appropriate information to the general public and populations that may be at risk.

AGM Summary Record

Diaoyutai State Guesthouse, Beijing

(December 12-14, 2012)

I. Introduction

The China Council for International Cooperation on Environment and Development ("the Council" or CCICED, pronounced "sea-said") was established in 1992 by the State Council of the Chinese government in order to foster cooperation in the areas of environment and development between China and the international community.

The Council is a high-level advisory body that puts forth recommendations on environment and sustainable development for the Chinese government's consideration. It has so far convened 21 annual meetings organized in five-year phases.

The Council supports the development of a comprehensive approach to sustainable development and environment through close cooperation between China and other countries. At present the Council is composed of 25 Chinese members and 25 international members who were chosen for their experience, expertise, and influence.

The Council is chaired by Mr. Li Keqiang, Vice Premier of China's State Council and a member of the Political Bureau Standing Committee. It was at his invitation that the members of the Council attended the first meeting of Phase V.

The CCICED Bureau serves as the executive body of the Council.

The Council's host institution is the Ministry of Environmental Protection (MEP). Previously known as the State Environmental Protection Administration, MEP is responsible for the Council and for ensuring inter-ministerial coordination. It has established the CCICED Secretariat (SERI) to support international and domestic contacts. The Secretariat supports follow-up in China to CCICED recommendations, and deals with routine matters when the Council is not in session.

The Secretariat is assisted by the Secretariat International Support Office (SISO), directed by Mr. Christopher Dagg and located at Simon Fraser University in Burnaby, Canada. Until April 2013 SISO was funded by the Canadian International Development Agency (CIDA), afterwards by Canada's Department of the Environment (Environment Canada).

This Summary Record of the CCICED's first meeting of Phase V was prepared by Patrick Kavanagh for SISO, based on detailed notes recorded during the annual general meeting (AGM). Representing SISO's interpretation of the discussions, the Summary Record does not necessarily reflect the views of all participants. To encourage frank and direct dialogue, the Summary Record presents an overview of the points made during comments and discussion sessions without attribution to individual speakers.

II. Annual General Meeting

Item 1. Adoption of the Agenda

China's Minister of Environmental Protection and CCICED Executive Vice Chairperson **Zhou Shengxian** called to order the first meeting of Phase V. He introduced the following dignitaries:

- Vice Premier of China's State Council and CCICED Chairperson **Li Keqiang**;
- Canada's Minister of the Environment and CCICED International Executive Vice Chairperson **Peter Kent**;
- Vice Chairman of China's National Development and Reform Commission and CCICED Vice Chairperson **Xie Zhenhua**;
- Managing Director of the World Economic Forum and CCICED Vice Chairperson **Børge Brende**;
- Deputy Secretary General of the State Council **Ding Xuedong**;
- China's Vice Minister of Environmental Protection and CCICED Secretary General **Li Ganjie**.

He welcomed guests, Council members, and observers to the 2012 AGM, focusing on the theme Regionally Balanced and Green Development. The Council adopted the agenda, and CCICED's 2012 AGM was declared in session.

Item 2. Adoption of CCICED Charter

The AGM unanimously adopted the revised CCICED Charter to regulate the activities of the Council during Phase V.

Item 3. Opening Ceremony

Executive Vice Chairperson Zhou Shengxian introduced Canada's Minister of the Environment and Council International Executive Vice Chairperson Peter Kent.

These are the highlights of Mr. Kent's address to Council:

The issues of China's environment and development are growing more complex and more demanding in terms of policy needs. Therefore our joint efforts must be robust and must provide new insights, and above all lead to practical and implementable advice. We can assume that our advice to the State Council will have to be sharply focused and directed toward new and emerging problems, as well as those requiring ongoing attention. We need to formulate advice that truly does seek a transformative change in how environmental problems are perceived, as well as acted upon.

While CCICED has the trust of many outside the country, it is China most of all that has expressed the need and vision guiding CCICED's work, and in this regard we note the success of the 18th Party Congress in elevating the concept of ecological civilization — or ecological progress — to the highest national policy level. By placing environment and development at the same level as the economy, culture, and social development, China indeed sends an important signal, not only to its own people but also to the rest of the world, about its resolve and its tenacity to create a new environment and development relationship.

We must take this shift of thinking into account when we plan the Council's future work. This first year of the new phase comes at a time when the global economic slowdown persists — and even in some cases worsens. We cannot avoid considering the impacts of this crisis on environment and economic relationships, on the implications for green trade and investment, and more broadly still for the success of the multilateral agreements affecting environment and development.

A number of past and present CCICED members attended the Rio+20 forum last June. The Council held a very successful side event with a roundtable chaired by Premier Wen, where it was possible to exchange views directly and with good insights. This session highlighted the need for a strengthened commitment to the concept of green development, both globally and on the part of countries. The implication for our work is that we may be called upon to provide advice relating not only to China's internal needs but also on matters relating to international cooperation and China's growing role on the international environment and development stage.

It is significant that China has gained valuable experience during the 11th Five-Year Plan (FYP) and now in the first two years of the 12th FYP. Over the coming

years we can marshal CCICED's efforts around the subject matter of green development. I hope it would be helpful in focusing China's longer-term development strategy as well as providing advice of more immediate value, including planning for the 13th FYP. I've seen the emphasis given to green development in the recent [World Bank] report *China 2030*, and I think this is an important timeframe to consider for our future studies.

This year's studies and recommendations have examined topics concerning regionally balanced and green development. We take seriously the observation by Premier Wen and others that China's overall development pattern still appears to be "unbalanced, uncoordinated, and unsustainable." How can green development overcome these challenges? That's the question driving our studies this year, and I expect for some time to come.

The five-year study reports cover important ground. Our task force on the 12th FYP makes suggestions on how best to meet the mandatory pollution control targets in an optimal fashion, and lays out some longer-term approaches that might guide future action during the 13th FYP and beyond. A CCICED task force has examined the western development strategy from a green development perspective, producing the outline for a green development roadmap suitable for this fast-growing region.

We have also undertaken three special policy studies that are particularly relevant to the eastern coastal region as it makes a transition to a more developed and post-industrial condition. One of the special policy studies examined green development in the three most economically significant locations in eastern china. The second examined the serious emerging problem of regional air pollution, especially small particulate matter, PM_{2.5} — or, as we often call it, 'smog. The third study examined how China can develop a better emergency response to regional oil spills, suited both for reducing the damage and high costs associated with incidents such as the Bohai Bay incident in 2011 as well for preventing such future events.

Granted, these studies do not cover the whole array of issues facing China's regional green development. But they have, I believe, helped us better understand the challenges and the opportunities for green development in different locations and for a variety of issues. The studies have considered the important role of local officials, and of enterprises relocating their production plants from one part of the country to another. And the teams have tackled the problems of integrated approaches to management in each of the problem areas examined.

Mr. Chairman, in your remarks to the Council last year, you noted that China needs an approach based on “protecting the environment while developing, and developing while protecting the environment.” You also characterized the new environmental protection way as “small cost, good returns, low emissions, and sustainable.” We must keep those thoughts in mind as CCICED formulates our recommendations this year and in the future.

Zhou Shengxian then introduced China’s Vice Premier and Council Chairperson **Li Keqiang**, who delivered the AGM’s keynote speech. Here are some of the main points:

When Vice Chairman Zhou invited you to review the meeting agenda and the charter of Phase V, both documents were adopted with a round of applause. This applause sends a message: in environmental protection and in our effort to develop an ecological civilization, there is a strong desire to strengthen international cooperation. On this, everyone agrees.

The history of human development is also the history of the interaction between people and nature. Some ancient civilizations prospered because of good ecology, while others failed because of ecological deterioration. During the past 300 years we created much wealth from industrialization, but we also paid a price in terms of resource use and the environment. In the latter part of the 20th century the international community began to think about issues such as limits to growth. New concepts emerged, such as the circular economy, green development, and ecological civilization.

The United Nations (UN) has convened conferences on environment and development, sustainability, and climate change. Gradually these discussions have been translated into actions by member countries. Thus the development of ecological civilization follows from agricultural civilization and industrial civilization — in fact it follows the direction of human civilization itself. In ancient China there was much ecological thinking along the lines of following the law of nature or the unity of people and nature. All this wisdom is still relevant today.

In the 1970s China began to pay more attention to pollution control and prevention. Since then it has actively participated in the course of the world’s environmental development. During the last 30 years China modernized itself and

practiced a basic policy of energy resource conservation and environmental protection. China has taken other measures to check environmental deterioration, but we are very much aware that we still face severe difficulties which constrain our country's development.

China has a population of 1.3 billion people. There is no precedent for modernizing such a large country, so we are now faced with a new challenge, but also a real opportunity. We should adopt the mentality of a tightrope walker: we should have the conviction that eventually we will reach our goal. It took developed countries 100 years to industrialize and urbanize. This process is in full swing in China, but at a faster pace. The environmental and development challenges experienced by developed countries have manifested themselves in China more intensely. Therefore we need to learn experiences, practices, and lessons from these countries.

We should also leverage our advantage as an emerging economy and avoid the pattern of "pollute first, treat later." Rather, we can develop in a new fashion, using the concepts of ecological civilization. These include respecting nature, accommodating nature, and protecting nature. The development of ecological civilization will be integrated into the whole process of modernization. We should protect the environment while developing the economy and so achieve a win-win — incorporating people's well-being, economic development, and protection for the eco-environment.

We need to enhance our efforts in these five areas:

First, green development. Environmental problems that have been created in the development process should also be solved in this process. In other words we need a modernization process featuring ecological civilization. A good eco-environment is wealth that cannot be bought or borrowed. If we are poor and have a good environment, that is not good enough. If we are well off but the environment is bad, that's not good either. So we should optimize land development to form the right production space, living space, and ecological space. Meanwhile we will press ahead with major ecological, environmental protection, and energy conservation projects.

Second, we want to improve people's livelihood and well-being. Modernization and the development of ecological civilization are for the people. People want to live well, they want good jobs, more income, clean water, and a beautiful environment. As a government, we have a responsibility to mobilize all stakeholders' efforts to treat

and prevent pollution. We should not leave things undone for future generation. Starting this year China monitors PM_{2.5} in the Beijing, Tianjin, and Hebei regions, as well as the Yangtze River and Pearl River deltas. This information will be made available to the public. This is only one indicator, but it is very symbolic. We hope that, with this effort, environmental quality will soon improve.

Third, we want to tap the huge potential of the domestic market and expand that market. We want to have a new form of industrialization and urbanization characterized by ecological civilization. This will bring about a huge eco-industry, for example, the application of renewable energy sources, the renovation of buildings to make them more efficient, or the treatment of wastewaters. All this will be new growth. Take for example the development of photovoltaics (PV). Currently, the domestic installation of solar panels accounts for less than 10% of total production. In the process of urbanization we will support the installation of solar power facilities, and thus promote the development of the PV industry. By 2020, China's solar capacity will reach 50 gigawatts. We can see that the ecological industry is an inexhaustible treasure trove.

Fourth, we need to deepen reform. Reform is essential to development and is also a strong driver of modernization. We need to step up reforms in many areas including enterprises, pricing, tax and revenue, finance, and government administration. We also need to improve the mechanisms governing payment for the use of resources and governing compensation for environmental damage and for ecological usage. We should also enhance the mechanisms for environmental performance evaluation, and the rewards and penalties schemes for behaviours and accountability. We should also use the right institutional setup to give incentives and disincentives, and use laws to regulate behaviours.

Fifth, we need more partnerships. Environment and development are challenges common to all the world. All countries want to develop and protect the eco-environment and promote green development. That's why just now you adopted the agenda and the Charter unanimously — because we see eye-to-eye on this. That's where the interests of many countries converge. China is a vast economy, and if we can solve these issues well, it will be a great contribution to all human society.

Item 4. Addresses, Special Remarks, Issues Paper

Statements by the Vice Chairpersons

With International Executive Vice Chairperson Peter Kent presiding, CCICED Vice Chairperson **Xie Zhenhua** addressed the Council, emphasizing the following issues:

China is at a crossroads in development. The average per capita gross domestic product (GDP) has just exceeded RMB 5000 — but we still have 180 million people in poverty. Therefore we need to make more efforts to protect the environment and improve the well-being of people. At present we face serious challenges. Development is much constrained by our limited land resources. The average per capita availability of coal, power, and other natural resources is less than half the world's average. Our resource production is just 1/7 that of Japan. Our GDP takes up less than 10% of the world's total, but our energy efficiency is poor because of high pollution and high natural resource consumption, combined with low production.

These kinds of problems appeared in the developed countries at different stages over very long periods of time. In China, however, all these problems have cropped up at one and the same time. This has made things even more difficult and complicated for us. If we want to achieve our goal to make families well off by 2020 we must change our mode of production and adjust the economic structure. It is not right for us to follow the old road of industrialization. We must find a new path for ourselves.

The government has attached great importance to energy conservation and the reduction of emissions. Presently we focus our efforts on pollution control in the major river basins. During the 11th FYP period, the reduction of emissions became a legally binding target. With years of effort and the adoption of many policies and measures, per capita GDP energy consumption has decreased significantly. Emissions of carbon dioxide (CO₂) and sulfur dioxide (SO₂) have decreased respectively by 14% and 12%. All this has contributed to the increase of GDP and the development of the economy. At the same time new types of industry have appeared focusing on the circular economy; the production volume of environment-related industry had a value of about RMB 2.3 trillion last year.

These are all symbols of progress, and they show that the Chinese government takes responsibility for future generations. It is important for us to understand the concept of ecological civilization in the development of industry and agriculture and in the processes of urbanization. We should make efforts to develop new lifestyles

and new industrial structures to protect the environment. Only in this way can we develop China into a beautiful country and create good living conditions for the people.

We hope to adopt a number of specific measures.

We aim to optimize China's spatial structure so that the population and the development of different industries and resources are arranged in a proper spatial pattern. By 2020 the forest should be increased by 3.12 million square kilometres, and we aim to maintain and restore the grasslands. Since the eastern and western parts of China are different in terms of culture and geography, we have suggested different development plans for them.

We hope that by 2020 the service industry can be increased by about 4% and also that environment-friendly industry can increase its revenues by about 8%. We plan to strengthen our environmental impact assessments (EIA) on the high-polluting and high-emissions projects, and to phase out gradually those energy intensive plants. We will make efforts to have more strict performance reviews and the evaluation of energy conservation and emissions reduction in different industries. And we hope that by 2020 we can save more coal and gradually decrease the use of coal in the future.

In all processes of production and consumption we need to promote the circular economy. For example, we must promote the reutilization of kitchen waste and of animal dung, and establish an institution for recycling. We aim to improve the reutilization rate by 15%. This morning we approved a plan for developing the circular economy, so this is going to be a long-term goal and we are going to carry it out in a down-to-earth manner.

We must readjust the energy structure and promote diversified and clean development. We aim to improve non-fossil fuels — such as hydro, solar, and biomass — so that by 2015 these fuels will provide 11.4% of China's total energy needs. Furthermore we must intensify our environmental protection, and particularly, address those forms of pollution that impair people's health. We must adopt integrated approaches and significantly improve the quality of the environment. For instance, we should focus on key watershed areas, control PM_{2.5} and other fine particulates, control pollution by heavy metals, and treat urban sewage.

We must promote ecological improvements and recovery, including the

protection of natural forests and grasslands, new plantation, the reversion of farms back to grassland, and control of desertification. By 2015, forest coverage will reach 21.66% and the total stock will be 13 billion cubic metres.

We must tackle climate change to reduce its impact on social and economic development and on people's health. We can raise energy efficiency, promote carbon sinks, control the emission of greenhouse gases (GHG), and take other measures. For regions at differing levels of development, we already have started some pilot projects involving low carbon products, "low carbon cities," and carbon trading. We also take an active part in international negotiations on climate change, where our principle remains: common but differentiated responsibilities.

Finally, we must improve our policy and institutions. We should exercise differentiated management so that China's regions will have varied investment, fiscal, land, demographic, and environmental policies. Resources will be reasonably priced, plus we will reduce the impact of CO₂ by pricing it. We must offer awards as incentives, support green, circular, and low-carbon development of industries, raise energy efficiency standards, and promote energy efficiency labels, as well as use other marketing tools. As usual we will organize Low Carbon Week, World Environment Day, and other publicity events. The media should also play a role to help shape opinion. The public should be encouraged to buy energy-efficient products, engage in green commuting, and oppose overpackaging. Thus there will emerge a way of living that is consistent with environmental protection and conservation, and so ecological civilization will become a leading concept.

International Executive Vice Chairperson Peter Kent then introduced CCICED Vice Chairperson **Børge Brende**, who presented the following remarks.

A nation has to be brave to seek independent advice outside the corridors of government. Since the 1990s China has shown, through the establishment of the China Council, that the nation is self-confident and brave enough to seek this kind of advice. We have an opportunity to make this fifth phase of CCICED an even more successful example of partnership by keeping our efforts focused on the most meaningful topics and potential outcomes.

During the past five years, when most economies in the western world have seen zero growth or have even been contracting, China has grown by 50%. China is now

the second largest economy in the world. It lends more money to developing countries and emerging economies than does the World Bank. In the future — and I think already today — developing countries will look to China, and not only to Europe and United States or other industrialized nations, for inspiration when they decide their development paths. This provides remarkable new opportunities for international cooperation and for global progress toward poverty reduction and environmental improvements.

This year's task force reports provide evidence that China has already made much progress on environment and development. Under the 11th FYP China achieved emissions reductions that normally occur during a later stage of industrialization. The efforts to reach this goal helped the nation begin to restructure its economy and to transform its growth pattern. At the same time, however, the progress made in China has not led to a level of environmental quality that fully satisfies the public.

China has shown that industrialized restructuring provides opportunities for environmental protection, because energy is used more efficiently and other changes in production take place. However, industrial restructuring in itself will not be sufficient to ensure further environmental progress. Towards 2020 China's environmental management system will have to be transformed from control of industrial single pollutants at relatively high costs to coordinated and dual control mechanisms at lower cost.

President Hu Jintao told the 18th Communist Party of China Congress that the whole Party must purposefully apply the idea of “putting people first” in the country's development policies and plans. This principle and approach wisely is being applied to environmental and development concerns, especially in relation to EIAs. But as we know, environmental issues continue to cause concern on the part of local people in China. Therefore I am so pleased that we will be examining social development concerns as part of our future work in CCICED.

A people-centred approach will highlight that environment and development policies must be designed to protect public health. It will entail that official decisions must as far as is reasonable be based on scientific knowledge and an understanding of the pollutants' effects on human health and ecosystems, and on seeking better economic and technological solutions.

This is a vast task for the government of China that likely will not be fully

achievable in the short term. It marks a shift in focus, however, from pollution control to environmental quality improvements. Environment quality standards in watersheds, regions, and cities would then become drivers for emission control goals, with the effect that both quality goals and emission goals could be reached.

In pollution control and many other aspects of environmental quality, transformative change will include moving from single issue to complex and coupled issues. Significant institutional strengthening will be required to ensure the necessary coordination.

This year's annual meeting has regionally balanced and green development as its theme. Ultimately it is in the provinces and at local levels that environment and development issues are played out. Establishing a green regional development strategy for different regions' specific needs and challenges could be an important tool for signalling what the sustainable growth path in the different regions should be. Like others, I have been impressed to see how environment has been mainstreamed into development thinking within China.

Vice Premier Li Keqiang has also underlined the historic perspective on dealing with the environment. He said that, in ancient China, high environmental standards and proactive environmental policy played a very important role, and that there was — and is — a clear correlation between a country's welfare and the way it deals with the environment. I think this shows an inspiring vision from the leadership of China in establishing and building a true ecological civilization.

Special Speech by the Minister of Environmental Protection

International Executive Vice Chairperson Peter Kent invited China's Minister of Environmental Protection and CCICED Executive Vice Chairperson **Zhou Shengxian** to brief the Council in a special speech. Minister Zhou made these points:

I would like to share with you my views on how to promote ecological civilization and build a beautiful China.

According to the concept of ecological civilization, we must respect nature, accommodate nature, and protect nature. This concept must be integrated into all China's political, economic, social, and cultural development. The creation of an

ecological civilization and the building of a beautiful China are the responsibilities of China's environmental professionals — for example, people involved in environmental assessments — who should be the leaders, agents of change, and practitioners for this development.

Ecological civilization is the aggregation of the material, spiritual, and institutional outcomes that people have achieved to protect and develop a good environment. It is a forum for harmony between people and nature, between people and people, and between people and society. To develop an ecological civilization we need to achieve these harmonies and also respect natural laws. We need to base development on the carrying capacity of environmental resources, and we should develop the right spatial structure, industrial structure, production patterns, and lifestyles. We must develop an energy conserving, resource conserving, and environmentally friendly society.

The building of a beautiful China is a new concept, a new vision for the China dream. We have had young China, lovely China, new China, prosperous and crowded and civilized China, harmonious China, and the revitalization of the Chinese nation. All these have been the Chinese dreams. Now this new concept is depicting the great vision of an ecological civilization.

A beautiful China is the sum of the beauty of our times, the beauty of society, the beauty of life, the beauty of people, and the beauty of the environment. Its prerequisite is the sustained and healthy development of the economy. This kind of society is characterized by social harmony, by a good eco-environment, and by a living environment that makes people feel happy and society more harmonious. It can help expand development space and improve the quality of growth, so as to achieve the perpetual development of the country and the great revitalization of the nation. Essentially it is an elevation of the ruling capacity of the Communist Party of China and an improvement of the ruling mentality and concepts.

A beautiful China should be a country with scientific development. We need to implement a basic policy of resource conservation and environmental protection. We should put people first and achieve coordinated and scientific development in the modernization process. In the words of ordinary people, a beautiful China means we have both money and a good environment. We are convinced that by pressing ahead with scientific development and by creating an ecological civilization we will build a beautiful country.

A beautiful China is a country of social harmony. People are asking for a better eco-environment and for good ecological products, and the development of a beautiful China will inject new vitality into this process. China's traditional *taiji* diagram shows that everything has two opposite sides. Only with the unity of these opposing sides can we achieve harmony. Human beings are a part of nature, so we find both opposing and unifying relations between human beings and nature. So, we need to have harmonious development and harmonious coexistence between human society and the ecological system.

Advanced ecological ethics are the values we need to observe, and a well-developed ecological economy should be the material basis. The ultimate mark of a beautiful China is the development of an ecological civilization.

A beautiful China is a country that fosters sustainable development. During the 1960s and 1970s people were awakened to environmental and ecological ideas. In the world today we are seeing the green economy and low-carbon technologies. We are seeing a new round of industrial development and technological innovation. Green and circular and low-carbon development are becoming the new trend.

The Chinese government aims to address environmental and development issues at a strategic level. We will achieve harmony between people and nature, between the environment and the economy, and between people and society, and in this way enhance our capacity for sustainable development. To build a beautiful China we need efforts from people in different walks of life and different stages of life. We need the right master framework design, with targets and objectives and tasks.

We also need action on the ground. According to the requirements of an ecological civilization we should develop the right spatial layout, industrial structure, and production mode, and lifestyles that conserve energy and protect the environment. We need to step up efforts in building a resource conserving and environmentally friendly society. In this way we can have a healthy economy, a sound eco-environment, and happy people. We will be able to reserve more land for the future and leave a very good environment for future generations.

The Chinese government is committed to environmental protection. We are working hard to address and solve the outstanding environmental issues that will affect scientific development and people's health. But we still face major challenges.

On basis of the 11th FYP, we have made progress this year in this area.

First, we have continued our efforts to reduce the emissions of major pollutants. We have focused on thermal plants, steel works, cement plants, paper mills, wastewater treatment plants, animal farms, and motor vehicles. Compared with the same period last year, emissions of a number of major pollutants are reduced in the first half of this year.

Second, we have further enabled environmental protection to play its role in optimizing the development of the economy. We have been strict with the environmental impact review of construction projects. For high-emission, high-pollution, and energy-intensive industries and projects we have enforced a very strict environmental threshold, and stepped up reviews. For projects not in compliance with the standards we have suspended or refused approval. I should also mention that, in addition to EIA, we should also start doing social risk assessments, and these should be considered in the development of all new project proposals.

Regarding construction projects, we now have a new context. These days, people complain to the government about projects located in their neighbourhood. The task before us is to step up reform in this area, and so we need to consider the following points: China is a country ruled by law, and we need to use laws to govern environmental protection; we need to expand public engagement and participation; and we need to practice information disclosure.

Third, our actions to solve environmental issues that affect people's well-being have achieved good results. For example, the State Council has published a newly revised ambient air quality standard, and we have begun monitoring PM_{2.5} indicators in Beijing, Tianjin, Hebei province, and the Yangtze River and Pearl River deltas, and furthermore publishing the information. This focus on PM_{2.5} shows that China is now targeting both primary and secondary pollution, so it marks a new stage in China's environmental protection.

Fourth, we have made progress in pollution prevention in some priority river basins. For the eight downstream provinces of the Yangtze River we have had a full review and evaluation of their river pollution prevention and control. We have done some restoration efforts along the Songhua River, and we are implementing measures to address drought prevention and control.

Fifth, and finally, we have enhanced our efforts for rural environmental

protection. We published the 12th FYP for the remediation of the rural environment which specifies targets, tasks, and supporting and enabling measures. We have also adopted the task breakdowns for China's biodiversity strategy and action plan, and for China's action plan for the UN Decade of Biodiversity. In other words the protection of biodiversity has been elevated to the national strategic level.

China is still at an early stage of socialist development. Inadequate development and inadequate environmental protection coexist at the same time. If we ignore the protection of resources and of the environment, we will pay a high price — even if our economy improves. Therefore we must find a new way to protect the environment during the process of developing our economy.

It is important for us to save energy, save resources, and protect the environment. To achieve these goals, we must develop new lifestyles and new production modes, adjust our industrial structures, and rearrange the spatial distribution of industries. We need to adjust the spatial structure to make our environment more liveable and to have clear water and beautiful mountains. Zoning is important to help us identify the environmentally sensitive or vulnerable areas.

We will make all efforts to reduce major pollutants. We should take into consideration the total amount of emissions but at the same time the carbon emission intensity. In some highly polluting industries with high emissions we will further accelerate our efforts in de-sulfuration and de-nitrification.

We will take measures to address the environmental problems that hinder scientific development and affect public health. At present it is important to bring under strict control the highly polluting and energy consuming projects and industries. We will continue our efforts to handle those big polluters that have greatly affected public health. It is the people's right to enjoy a good quality environment, and this is a public service that government should provide. Thus we will aim to address issues like safe drinking water, heavy metals, hazardous wastes, and PM_{2.5}.

As I mentioned already, this year the State Council approved the 12th FYP for pollution control in major areas. A package of policies will be taken to address PM_{2.5}. Reduction targets have been set for specific cities, provinces, and river deltas in China. Other measures aim to control the consumption of coal and therefore emissions of volatile organic compounds (VOC) and other multi-pollutants.

We will also have more ecological demonstration projects in future. Since 2000 we have been working to establish ecologically friendly cities, provinces, and counties.

Finally, we will make efforts to set up “ecological system institutions.” We must improve our laws and regulations and make use of market approaches, for example fiscal and taxation policies and pricing. The ecological compensation system, the accountability system, and punishment for damaging the environment — all these should be integrated into the performance evaluation of local officials.

The CCICED Issues Paper

International Executive Vice Chairperson Peter Kent introduced CCICED Chief Advisors **Shen Guofang** and **Arthur Hanson** who outlined the 2012 Issues Paper to Council. First, **Shen Guofang** made these brief points:

Here at the beginning of the fifth phase many CCICED members are new, which makes our issues paper particularly important. Also, our AGM comes soon after the conclusion of the 18th Party Congress. One chapter in the Party’s report to the Congress is entitled “Making Great Efforts to Promote Ecological Progress.” This report has put the development of ecological civilization in a high position, ranking it among economic, political, social, and cultural progress, and it has called for the integration of ecological civilization into all aspects of development efforts.

Note that the literal translation of the Chinese phrase *shēng tài wén míng* (生态文明) is “ecological civilization.” But the official English translation at the Party Congress was “ecological progress.” On the posters here in this room you can see that the Chinese text refers to ecological civilization, while the English says ecological progress. In my opinion the phrase ecological progress is weak, and I personally prefer that we use ecological civilization.

Then **Arthur Hanson** introduced the Issues Paper at greater length:

Following the recent Party Congress, we now have three different levels of thinking we can take into account in our work with CCICED.

First, we have this broad level of ecological civilization, or ecological progress. Ecological progress has been elevated to join economic and other kinds of progress,

where we have seen considerable advances in China for example in the reduction of poverty. So in that sense “progress” is a helpful word. But whatever the interpretation of these words, the new game is that at the highest levels of state policy, environment now takes a major seat at the table. A number of senior leaders have been concerned about the environment for a long time, but now it is officially on the agenda at a different level.

The next level comprises our efforts regarding green development. This field encompasses many subcomponents such as the circular economy, low-carbon economy, and so on. In the field we have a situation where every department and unit of government and various industrial sectors all have to take into account different ways of doing business. But green development is not just about any one department — it is how everything is knit together in dealing with environment and development.

The third level — an “operational” level — comprises the activities of MEP and others which are really about environmental protection and environmental management.

It is helpful to break all this down because we have to think about our policy recommendations in quite different ways within these three different levels.

The words of Premier Wen are important to keep in mind. He has talked about a “green and prosperous world” and I think what we are hearing is that China wants to play a significant role in helping create that kind of world. But China also recognizes that if other nations do not follow through, China will suffer as a consequence. In other words if we don’t have a green and prosperous world, it affects us all, whether it is through climate change, biodiversity loss, or a number of other concerns.

Premier Wen also has said that China’s development is “unbalanced, uncoordinated, and unsustainable,” and that’s really the starting point for this year’s Issues Paper. We were asked to look at regionally balanced and green development, and how to turn unbalanced, uncoordinated, and unsustainable into balanced, coordinated, and sustainable. That’s the big challenge, and it’s one that is not being met sufficiently at the present time.

This year we ought to look at three reports in particular. One is the *People’s Republic of China National Report on Sustainable Development* put together for the Rio+20 summit. In 2002, for the Johannesburg meeting, China assembled a much

slimmer report, but still a very interesting one. It's intriguing to look at the contrast between that earlier report and what has been published now, which is a very hopeful kind of document even with all the limitations and the challenges that need to be met.

The second report is *China 2030*. This is a joint effort by the World Bank and the Development Research Center of the State Council. One value of this report is that it takes the perspective of 2030, which is the time frame that CCICED must shift its focus towards. Also the report deals with the need for green development, but in opportunity terms. It makes the case that it is a good thing for China to become engaged in and to take full advantage of a green development path.

The third report, also focusing on the longer term, is by the Asian Development Bank and is titled *Toward an Environmentally Sustainable Future*. It is a very hard-hitting, blunt document that points out some of the shortcomings of today's development. It is aimed at the third level, the level of environmental protection and pollution reduction that I spoke about.

For the benefit of new members, we should understand what we mean when we talk about green development. One of our members is Hu Angang, from Qinghua University. His definition is "People-centred, unified, and harmonious development of the economy and the environment." This is a concise and useful way to explain green development in China.

China has gone through different ways of looking at regional development. The regions themselves are substantial in terms of population, and they have different stages of development. So one of the key starting points for the work of our task forces is this one word: differentiation. One size does not fit all. In a big country like China, people are different in their thinking and expectations.

This means that there must be differentiated approaches, approaches that are not necessarily based on political boundaries. There are many ways of looking at regional differentiation. Among the key approaches for our task forces are what we call ecological functional zoning and urban development clusters.

Another approach is to look at the gaps between rural and urban. How do you address some of these gaps — in income, happiness, education, expectations — between different rural and urban settings? We often hear people speak of China's "poor rural areas and rich urban areas." But there are many good things about rural

lifestyle and experience that will be essential for the future of China. How do you make those rural areas sustainable?

We keep coming back to the idea of “capitals” — natural, human, and social capital, as well as financial and economic capital. But one kind of capital that’s absolutely essential is human capital, in the form of healthy and well-educated people. Human capital is the key to balanced rural/urban development in different parts of the country.

Another important example of China’s unbalanced situation is ecological services for healthy cities. The upstream stewards of those ecological services need to be compensated, but the users, the beneficiaries in downstream cities, have not been paying. China has one of the biggest eco-compensation programs in the world, but it doesn’t work as efficiently and effectively as it should. Furthermore, it is being paid for largely by the central government.

Under the concept of functional zoning, China wishes to designate the areas that need protection as opposed to areas that can be utilized intensely for industrial or other kinds of development. But the areas that need protection are mostly in Western China, which becomes costly for this region and sometimes makes it difficult to conduct economic development at levels locally desired. China’s functional zones are not working well now. How do we actually protect them? How do we compensate for the fact that they must remain green.

In Eastern China however we see a dream come true for many people. This region holds 3% of China’s land mass, 20% of its population, 45% of its GDP, and 70% of its international trade and investment. These are the people who have made it, whether in Beijing, Tianjin, Shanghai, or Guangzhou. They are getting rich, and the income gaps are getting larger between those areas and other parts of China.

In Western China the focus is on ecological services, poverty reduction, sustainable resource development, sustainable rural development, green industrialization, and infrastructure. If we think only of ecological services, China’s future must include something that no country has been able to do yet. First, it must eliminate completely any degraded areas such as deserts or damaged wetlands. Second, it must have adequate provisioning services, such as agriculture, and adequate regulating services like good watershed management. China wants and needs more food, more provisioning services, and the maintenance of regulating

services. This is a huge challenge that no country has successfully achieved yet.

In Western China many mining and extractive industries are developing. In the case of rare metals, for example, China itself has said that for environmental reasons China should hold back on developing these because they are extremely difficult to manage, especially with many smallholders involved.

In Eastern China one of the big challenges is decoupling growth and pollution. The timeframe has to be something like 2030 to be able to do this, but how far can we go in decoupling economic growth and resource consumption and pollution emissions?

China's lack of coordination is largely an institutional issue. The PM_{2.5} haze over the country is a difficult problem, and it is not going to be fixed by 2015. That is just the beginning of a 20- or 30-year battle against smog, because of the many automobiles and other new sources of pollution. The dilemma is that no one province or city can deal with the problem on its own. It requires coordination across the different regions of China.

Similarly, the 2011 Bohai Bay oil spill was very expensive considering it was a relatively small spill. The incident exposed the weaknesses from the lack of coordination among the various response organizations. It was a dramatic example of an uncoordinated, inefficient, and costly outcome. And in Jiangsu province, a pipeline was proposed to pipe waste to the ocean from a pulp mill located a long distance away, perhaps 100 kilometres. The local people just said no, and the government responded and also said no. But it was a costly process due to the poorly coordinated effort in making a decision.

When we consider China's lack of sustainability, we need to move from targets — such as risk reduction targets or emission reduction targets — to actual environmental improvements. What are the outcomes we are actually seeking? Is it human health, or ecosystem health, or even a lowering of the impact on China's GDP? It is a fact that China's environmental problems have limited its real economic growth.

Something that people talk about a lot, but limited statistical information is available, is the wealth inequality in China. This issue has regional and sustainability implications.

Now I will focus on the specific issues.

China's environment still faces serious challenges despite serious mitigation efforts. In spite of all the effort made during the 11th and 12th FYPs, the challenges remain quite serious. The situation is getting worse, not better.

Today's regional development strategy really does not guarantee sustainable development within and among regions. This is an important conclusion, because despite the efforts of the National Development and Reform Commission and others, the regional development strategies are not based sufficiently on sustainable development criteria.

Mechanisms for differentiated regional green development are still at an elementary stage. This includes the very important mechanism of main functional zoning. We believe it is a good idea, but it is not ready yet as a reliable tool. It is not working well.

Industrialization and post-industrialization processes require separate but linked green development approaches. On the one hand we see an industrialization process that is not going to be perfect, especially in Western and Central China, but at the same time people are trying to understand in the big cities how to manage post-industrialization processes.

Green development coordination and integrated management are still limited. They lag behind GDP growth and economic considerations.

China lacks a clear long-term vision and strategy to guide national and regional action for green development. We do not want to be too critical of that — it is just that the game is changing as people are moving, and that requires a new strategy. In CCICED we should be thinking of how to help, and some of the roadmapping we have done this year is quite good for that purpose.

We need to consider the alignment of China's green development efforts with international green economy trends. China is well on the way to doing so, but it has to be carried out in a vigorous and helpful way, taking some international ideas but also giving to others China's own experience.

In conclusion, the period 2012 to 2020 — that is, the 12th through the 13th FYP — requires that we see transformative change, in environment and economy and in

many social aspects as well. The big payoff will come 2020 to 2030 when we can achieve solid results with green development.

Putting people first is essential. As Xi Jinping recently said:

Our people have an ardent love for life. They wish to have better education, more stable jobs, more income, greater social security, better medical and health care, improved housing conditions, and a better environment. They want their children to have sound growth, have good jobs, and lead a more enjoyable life. To meet their desire for a happy life is our mission.

The role of CCICED is to support that mission with good policies and thinking, and good analysis based on the Chinese situation and on our experience from other countries. That is our challenge for the next several years.

General debate and comments

It is gratifying to hear that China will increase its wetland area, because oceanic wetland is decreasing significantly. Since 1950 over half China's coastal wetland has disappeared. In the next five years another 50 million square kilometres of wetland along the coast will be lost. The public does not understand the value of coastal wetland or the fact that we should protect it. Coastal wetland has a sulfur purification function so, if the wetland is lost, this function is lost. As well, coastal wetlands support a number of ecological resources such as fisheries and tourism.

China has reclaimed land from the sea since ancient times. In the past the method was simple: people used manual labour. It was a very slow process, which meant that the environment that was affected had time to make corrections. But now things are more sophisticated. People are using advanced technologies and machines, so it is not possible for the eco-environment to make corrections. The results are disastrous.

In the past, CCICED focused on land-based pollution, and little attention was given to oceanic pollution. For the next five years the Council should give more attention to pollution related to the sea, and the issue of coastal wetlands should be put on its research agenda.

CCICED needs to be looking far forward — to 2030, 2040, 2050, and beyond —

for a long-term picture of where China wants to go and what it will look like. China needs to keep options open and ensure there are no investments or “sunk costs” that will become an inhibition to achieving those outcomes.

Item 5. Task Force and Policy Research Reports

CCICED Vice Chairperson Børge Brende chaired the presentation of the task force reports.

Task Force on Policy Mechanisms towards Environmental Targets for the 12th Five-Year Plan

In presenting an overview of their report, task force Co-Chairs **Wang Jirong** and **Dan Dudek** made the following points:

We conclude that China has great resolve and the right focus, and already it has taken strong measures. China’s emission reduction targets under the 11th FYP have been exceeded, laying a good foundation for future development.

The Chinese economy is in a transitional period. In 2011, China’s per capita GDP was US\$ 5432, making it one of the middle-income countries. But there remains great disparity between Eastern and Western China in terms of the stages of industrialization. The economy will enter a stage of medium level growth and it will be more driven by consumption. The centre of gravity of economic growth will shift westward. China is now in the middle and late stages of industrialization, a process that is expected to be completed by 2020. By 2025 per capita energy consumption will slow, and by 2030 urbanization will be completed.

At the same time the public is becoming more aware of its environmental rights, and people now have higher demand for environmental quality. Already we see the NIMBY [“not in my back yard”] mentality among the public. Because environmental monitoring equipment is small and portable, and because of the easy access to information on the internet, these technologies will have a profound impact on environmental protection. Gradually, environmental issues are becoming as important

as economic development and living costs. GDP, CPI (Consumer Price Index), and PM_{2.5} are becoming the “3Ps” that people are most concerned about.

Currently China’s level of economic development is similar to that of the United States, Great Britain, and Germany in the 1960s and 1970s. Although China’s economy today is about 1/5 that of the United States level in 1996, China’s current standards on PM_{2.5} are similar to those enforced in the United States back then.

In environmental terms China is in a transitional period. The country faces all kinds of environmental problems typical of different stages of industrialization. For example, China’s control over GHG and PM_{2.5} is quite advanced, but the problems of heavy metals and soil pollution, among other issues, lag behind economic development.

China will face more complex circumstances as it enters later stages of industrialization and urbanization, because the total amount of pollution will be greater. There will be a mismatch among industrial location, resource availability, and ecological vulnerability. And the public will make greater demands for environmental protection. So, we need to adjust our policies.

For example, there must be regional control measures. We must differentiate between secondary and traditional pollutants. There should be coordinated control to tackle a phased transfer of pollutants. We must respond to the public concern over environmental quality. We must be conscious of the cost-benefit analysis. And we should uphold fairness and justice in terms of the environment.

We propose a medium- to long-term pollution reduction roadmap. We must continue “total amount control” of pollution, and we suggest that during the 13th FYP there should be both controls over total pollution and quality improvement. Actually the demand for a better environment will force us to cut total pollution, and the cuts on total emissions will force economic transformation. We also suggest there should be pilot projects on environmental quality control in Beijing, Tianjin, Hebei province, and the Yangtze River and Pearl River deltas. Environmental quality should become the bottom line of urban development. We should also take into consideration how much the public can accept.

At the same time we should make the prevention of environmental risks an institutional arrangement. For instance there should be national strategies and

objectives, and a managerial system for uncertain risks. We should draw on international practice so that companies will become the main players in preventing environmental risks, and there should be a compensation system and an environmental damage assessment system.

The way government assesses official performance should gradually shift from overall binding targets on total emissions and guiding targets for quality, to a combination of the two. And then, it should shift to one system with binding targets for quality and guiding targets for total emissions.

In terms of environmental management, we must strive for new managerial approaches. We need a greater environmental authority with clearly defined responsibilities. We should also give a greater role to the public in monitoring.

We should encourage companies to build good environmental credibility ratings. The 12th and 13th FYP periods remain critical in our initial control efforts, but as we decide the targets we should adopt a differentiated approach. There should be top-down and sectoral control so that good performance gets rewarded. In typical industries we should introduce assessment systems which encourage companies to put pressure on themselves, to hold themselves to stricter discipline.

We should control the overall consumption of resources and energy so there will be role models for complete decoupling between resource consumption and economic growth. There should also be a bottom-up, regional total amount control which will result in different control targets in different regions. We should also make coordinated efforts to cut multiple pollutants.

Our target is to improve environmental quality, and to do this we must take as our foundation environmental functional zoning and environmental quality management. We must have medium- to long-term action plans and policies. Our efforts should be in different phases, and the public must have ownership over this.

In 2011, targets to cut SO₂, chemical oxygen demand, and ammonia nitrogen were all exceeded, but nitrous oxide (NO_x) emissions increased by 5.73% and the power sector saw a NO_x emissions increase of 6.84%. This makes our effort to meet targets more difficult. So, we must have strict control over the total emission of NO_x in thermal power, iron and steel, and cement sectors.

Furthermore, we must have special pricing policies for power plants with de-nitrification facilities, and policies to encourage small engine vehicles and restrictions on car ownership. There should be an environmental tax, plus efforts to control pollution in agriculture and in the papermaking, textile, and dyeing industries. For regions not in compliance, we should have a policy of “double offsetting.” We need corresponding industrial, environmental, and political policies for building a beautiful China.

Here is our suggested definition of “ecological civilization”: a society where the actions of the government, enterprises, and individuals are guided to procure the protection of human health, the provision of ecological services, and the long-term survival of diverse species on the planet while providing for the economic welfare of all people.

The first part — about protection of human health — is key. A transition is needed from discharge standards and amount control to ambient standards — standards based on levels that are protective of human health. From those ambient standards we can derive plans, the timing of reductions, discharge standards, and total amount control. So this redefinition is toward what we really mean by environmental quality.

Another issue is emissions inventories. In China there are multiple and uncoordinated emissions inventories that are generated by different methodologies, different government departments, and different jurisdictions. This makes it a challenge to plan, to do risk assessments, and certainly, to implement change.

A third element is permits. Permits have been on the books in China for a long time but they have not been well implemented. Permits are an essential part of the chain of responsibility and accountability that runs from the people to the government to sources. Permits serve to place in front of the sources — in a single unified document — all of their environmental responsibilities.

Fourth, we must bear in mind the duality of energy and the environment. Making decisions about energy investments means you are automatically making decisions about environmental investments. It is time to shift from end-of-pipe to a focus on efficiency and source reduction. For example, do we really need to invest in the next power plant? Shouldn't demand-side management be thought of as a pollution control strategy? In California, they have maintained per capita consumption of electricity

relatively flat for 30 years by emphasizing this approach. This is something that would be transformative in China.

Fifth, regional coordination need not be a complicated idea. How did the Yangtze River delta become such a significant economic engine in China? How did the roads from Jiangsu to Shanghai to Zhejiang connect up so that where one ended at the provincial boundary it connected with the other? It was through the joint responsibility and self-interest exercised by cooperation on the part of governments.

The final element to flag is water, where we have a duality between quantity and quality. We have distinct separation of management there — there is no integration. The pricing is irrational and so are incentives for water use. We see increasing climate stresses on water uses which are likely to become more intense. All these imply the importance of laying down a comprehensive integrated framework now, in preparation for the 13th FYP.

Task Force on Strategy and Policies on Environment and Development in Western China

Task force Co-Chairs **Ding Zhongli** and **Robyn Kruk** introduced the main points of the report:

The task force focused on three major questions: *Is it feasible for Western China to follow a green development mode? Can the resources and the environment support the current development model in Western China? And if green development is feasible, what are the key policies and strategies to support such a development mode?* We analyzed Western China in terms of the region's potential, coordination, sustainability, and balance. We found that the situation is highly uncoordinated, unbalanced, and unsustainable. This means we must face certain challenges.

First, we must consider the carrying capacity of the environment in the region, and if we want to guarantee balance then we must adjust our policies. Second, Western China is located at the upper reaches of many rivers, and therefore any environmental degradation in this area will affect the quality of development in areas at lower reaches. And third, Western China plays an important functional role in the protection of the environment — not only of China but also of the world — therefore in this region it is wrong for us to seek development at the expense of the environment.

Our research has uncovered much valuable experience from overseas, especially from Australia and Canada, both of which are geologically similar to Western China. We researched also in Sichuan, Qinghai, and other places, and on the basis of all this work our task force has produced a roadmap and a framework for green development in the west.

There are very clear synergies among the findings of this task force and the work of previous CCICED task forces and other research bodies. We acknowledge the very strong political commitment for coordinated, balanced growth, but China has not yet balanced socio-economic income levels nor arrested the degradation of the environment. A clear message from these task forces is that a business-as-usual scenario will not meet the high targets set by the government.

The major challenge is the translation of ambitious targets to action at a regional and a local level. We very strongly reiterate the importance of a focus initially on Western China, but in our roadmap we have provided a policy tool applicable to China as a whole.

Here are our recommendations:

The government of China should prepare and implement as soon as possible a green development strategy for Western China. We recommend an integrated roadmap. We believe there are risks in having a functionally based roadmap or one that is developed at the national, or regional, or local level, or on a sectoral basis. No one agency, no one level of government can effectively implement the ambitious targets set by the government. We also believe that if progress is not made on an integrated green development roadmap, there is actually a high risk of irreversible environmental degradation.

Programs to deliver eco-construction and other means of protection of Western China's ecological services, ecosystems, and biodiversity should be better integrated and coordinated with those for poverty reduction in provinces and at local levels as a long-term seamless set of programs with a more unified basis of delivery. We have already heard strong messages about the need to integrate in speeches by ministers and in task force reports. What is significant in Western China is that the areas of highest poverty coincide with the areas of greatest environmental fragility and with the areas of greatest resource significance to China as a whole. This makes integration

and coordination imperative — and high risk. If it does not occur, opportunities will be squandered.

Invest substantially more in programs specifically designed to increase and improve human capital in Western China to reduce poverty, and to enable the pace and quality of green development to accelerate, especially through green infrastructure construction and servicing. Investment in human capital and poverty reduction should be considered at one and the same time. Building infrastructure in Western China helps bring about green outcomes but also increases employment and increases human capacity in the region.

Reform financial programs and mechanisms at all levels of government to more effectively target and drive green development via sustained funding. We make three specific recommendations: a) establish a green development fund in order to provide sustained, coordinated funding streams rather than project-based funding; b) establish a royalties-to-regions tax program, similar to those operating in jurisdictions internationally, again to provide a sustainable revenue source and direct benefit to local communities; and c) accelerate environmental fiscal reform.

Make main functional zoning work effectively to support decisions and actions which lead to regionally balanced and green development. We have heard from many officials that main functional zoning is an important start, but there is still a long road to go. We have heard messages that there need to be greater clarity, linkages between main functional zoning and EIAs, and linkages between urban and rural planning. And ministers have acknowledged the importance of spatial planning.

Develop and adopt a sustainable urbanization model, including an eco-city approach tailored specifically to the needs and interests of provinces in Western China. One of our task force members described urbanization and the government's commitment to it as “the wind under the wing for Western China.” We stress the importance of fostering eco-cities as a long-term strategy, and we highlight the importance of using urbanization as an opportunity to enhance well-being, to minimize negative resource impacts, to increase energy efficiency, and to ensure that public health and safety is given equal prominence in that part of the growth strategy.

Encourage new green industries that reflect the character of Western China in the key and limited development zones, especially in areas of high poverty and areas of the greatest potential. Industry has sent a clear message: give us the certainty so

that we understand the rules under which we can operate in Western China. The government's commitment to improving employment, health, and well-being of the citizens of Western China means that green development offers opportunities in many respects. We strongly encourage the development of green entry standards specific to Western China, recognizing that the area is unique and that decisions taken in West China can have consequences for all of China, indeed for the whole world.

Strengthen institutional innovation to drive long-term green development. This echoes recommendations of previous CCICED task force reports and those of our colleagues presenting today. The critical importance of having reliable, consistent, transparent data was mirrored in every one of our recommendations. The need for public confidence in the data was mentioned by Premier Wen when our task force was established 12 months ago, and has been echoed by all the officials we met. We stress the importance of having a commitment both politically and financially to an independent monitoring system that actually measures progress on the roadmap.

Special Policy Study on Environmental Strategy and Measure for the Transformation of Development Mode in Eastern China

The Co-Chairs of the special policy study, **Sarah Liao** and **Peter Hills**, delivered an overview of the study's findings and recommendations. Here are the main points:

We very much wish to thank specifically Professor Tang Xiaoyan, from Peking University, who is actually the "real" domestic Co-Chair, the coordinator of our group, the leader, and the person with experience and expertise who has inspired all of us with her passion for the environment.

The study had three principal objectives: to get a better sense of the meaning of green development, to review the development strategy in Eastern China and to see what environmental challenges had arisen, and to identify lessons from this analysis and develop policy recommendations. The project took six months to complete, and involved desktop research and a literature review, quantitative data analysis, qualitative and case-study analyses, and brainstorming sessions with experts in different parts of China.

We can make the following observations about Eastern China:

The region is not homogenous. We found different development patterns in

different areas. One distinct feature is the very high rate of growth, rapid industrialization and urbanization, and the associated high cost in terms of environmental degradation. However, Eastern China is now undergoing a process of economic restructuring. Tertiary industry is becoming more important and is growing at the expense of manufacturing industries.

Economic restructuring has produced some localized environmental improvements, and some evidence of the decoupling of economic growth and environmental quality. Economic growth has continued while emissions and discharges have turned down over time, indicative of some element of decoupling

The mega-events that we investigated — namely the Beijing Olympics, the Shanghai World Expo, and the Guangzhou Asian Games — had some interesting effects, both temporary and longer term. These included: some of the most dramatic and notable reductions in industrial production over a short term, the closure of certain industries during the period of the event, and serious controls on traffic. In the longer term, more sustainable benefits included infrastructure provision and longer-term industrial relocation. It is clear from our analysis that mega-events can produce quite significant environmental benefits.

The tertiary sector is becoming increasingly important in Eastern China and is the most important energy consuming sector in some areas. However, the use of clean energy remains relatively low, and total energy consumption is continuing to rise in the three areas we investigated. The role of the domestic sector as an energy consumer is also becoming more prominent as industrial output sources are being overtaken by service and domestic sector consumption. The saturation rates for consumer durables in cities like Beijing and Shanghai are now very high, and probably matching international standards. Domestic-related air pollution emissions are becoming more significant as industrial emissions tend to hold steady or diminish.

We have seen how air quality has changed in the Pearl River delta region. Between 2006 and 2012 there have been some improvements. The peak levels around Dongguan have been reduced, but at the cost of spreading air pollution and creating lower air quality standards over a wider sub-region. So yes, it is possible to achieve improvements, but these also result in some cases in a levelling out of conditions at a somewhat deteriorated level.

We developed four propositions which help define the scope of our analysis: a)

government has a critical role to play in facilitating, promoting, and implementing green development; b) natural resource constraints and increased public awareness are heightening concerns for achieving a better balance between natural resources and consumption; c) market forces have an important role to play in influencing the pace of green development; and d) regional economic and environmental cooperation is a key factor in the pursuit of green development.

We emphasize that the pursuit of economic progress, or ecological civilization, or sustainable development is a long-term transition process and must continually be reinforced through the policy-making process. This point is reflected in our overarching prerequisite, which is a precursor to our recommendations: that the policy mechanisms and institutional adjustments are introduced and reinforced throughout the different levels of government.

Our recommendations for the whole of China emphasize the need for:

- Policy integration and coordination.
- A strengthening of regional monitoring capacity and measures, including establishing a new coordinating body under the State Council — like a “green development commission” — to serve as a platform for discussion of policies across a wide range of policy domains.
- More effective enforcement and much more stringent controls on minimizing the impact of development on the environment, particularly through the environmental admittance system and through strengthening the EIA system by increasing the rigor of its implementation to match international best practice.
- Developing a performance-based accountability system on green development at local governments, to monitor the performance of local officials.
- Heightening public awareness on environmental protection and promoting public participation.
- Accelerating the process by means of carefully selected pilot and demonstration projects.

We also make recommendations specifically for Eastern China:

- Adopt more stringent environmental standards and targets, even going beyond national standards.
- Establish greater information transparency.
- Advocate and promote green consumption concepts and behaviour through voluntary actions plus supporting measures such as tax incentives.
- Set up a regional fund for environmental protection and pollution control projects, for example to facilitate the assessment of environmental health risks or to deal with problems like industrial soil decontamination.
- Establish a regional financial transfer payment mechanism that would allow for environmental protection in less-developed areas and would encourage co-development initiatives between neighbouring regions.
- Promote corporate environmental governance and responsibility.

Comments on the task force and policy study presentations

Often we have tried to develop an entire country using a uniform paradigm despite recognizing our diversity in markets and scale. Commonly we build a few large projects instead of a lot of smaller projects — which is what the developing regions need more. We have adopted “global wisdom” but we have left behind our traditional wisdom. And often we fail at aid effectiveness and donor harmonization. We finance many projects in the developing regions without having proper coordination of these programs.

I do share the concern about whether to use the term “ecological civilization” or “ecological progress.” I think the term “civilization” covers a whole range of human interaction within a society — the way you think, live, conduct business, advance your cultural interests, and so on. So it is important that we don’t lose sight of that higher level of ambition or vision.

Given the urgent need for China to take dramatic, transformative action, and given the enormous energy this will entail, perhaps during the transformation of the various aspects of its economy and society China could take the lead in developing a few of the metrics that would help us gauge these sort of changes, particularly in comparing regional development in different parts of the country.

Instead of using Canada and Australia as comparative examples, it might have been more appropriate for the task force on Western China to look at emerging countries that, like China, face large population pressures. I am thinking of countries like Nigeria, Turkey, or even Brazil, which made its move westward during the 1960s. It would be more appropriate to look at emerging-country conditions rather than advanced-economy conditions.

Regarding the proposal to launch a green development fund, note that of the 60 or so such funds that have been created around the world, most have failed. Only the green development funds in Norway and in Alaska are sustainable and are working. When planning for a green development fund, we should look at what has failed and not repeat the same errors.

Using royalties from businesses that go west is a very delicate issue. It has to be handled well because usually if it is handled by governments these royalties disappear. They go into the black hole. And it discourages private sector investment from going west. Therefore, discussions about the green fund and about royalty distribution should be carried out in conjunction with the private sector, for example with private asset management advisors and fund managers.

It is vital that good targets be established for green development, but again, these discussions should be done with those people who must implement these targets. There is no point discussing targets if you don't involve the parties who will be required to meet them.

The Council should be aware of the issue of short-lived climate pollutants such as black carbon, methane, tropospheric ozone, and some hydro-fluorocarbons. These pollutants can have harmful impacts on human health, agriculture, and ecosystems. They are also responsible for a substantial fraction of global warming as well as having regional climate impacts. Action to reduce these pollutants, especially methane and black carbon, can slow the global warming experienced before the year 2050 by as much as 0.5 degrees, as well as prevent over 2 million premature deaths each year and avoid annual crop losses of over 30 million tons. Many cost-effective options are available for addressing these pollutants, such as upgrading, trapping black carbon emissions from diesel engines, harnessing methane from landfills as a source of energy, and using new technologies to avoid the use of hydro-fluorocarbons. This issue of short-lived climate pollutant emissions is important in the regional, national, and international contexts. Perhaps the Council can consider starting with a special

study.

In the three presentations we have just heard, the social aspects could have come out a bit stronger. At Rio+20 there was a strong plea to have the social, economic, and environmental strands better woven together. Here, equity issues and social considerations could be considered further. For example, when we do an EIA, we could also look at social and environmental safeguards.

Also we should look more at the South-South potential and at South-South collaboration. Lessons and proposals heard here are also applicable to many other countries in the South.

The current investment growth rate in China's west is excessive. If we cannot control excessive development we will face a very different situation in environmental protection. The western regions want to raise their per capita GDP to the eastern level in 10 years. Some of the western provinces are projecting GDP growth targets as high as 13%, or 17%. Many of them are relying heavily on land investment or similar ineffective investments. If this cannot be addressed properly then it will be hard for us to achieve green development in the western regions.

As far as strengthening environmental protection is concerned, the market alone cannot work wonders. There must be complementary laws, the role of the government, and public participation. We need to give guidance to the market rather than give the market a free hand.

Special Policy Study on China's Marine Environment Management Mechanism Based on the Bohai Sea Oil Spill

Research team Co-Chairs **Shi Peijun** and **Olof Linden** presented the results and recommendations of their study:

Our study team focused on how to accelerate marine economic development and at the same time protect the marine environment. At present we have a solid foundation for marine economic development but we cannot afford to ignore some of the problems. The proliferation of "marine economic regions" at the provincial and sub-provincial levels makes it obvious that we do not yet have an integrated approach and that marine economic development is fragmented.

China's marine environment is deteriorating constantly. Of all China's important coastlines, there seem to be more problems in the Bohai area, and pollution here is increasing all the time. The economic activities are labour and energy intensive, which has put great stress on the local environment. At present land-based and ocean-based pollution are increasing and intensifying. The risks of hazardous environmental outbreaks and accidents also will tend to increase in coming years.

We have learned a lot by studying the experiences of other places, for example the Gulf of Mexico and the North Sea. In the United States and Norway the management of oil spills is effective and they have very quick emergency response.

China has a lot of natural disasters and in handling these the Chinese government is very effective. However it seems we are not efficient enough. We need an integrated approach to deal with oil spills and marine environmental problems. At present China's marine environmental management system is outdated, the management mechanism to deal with accidents is not effective or efficient enough, and implementation is poor. The government mechanism is fragmented: there are nine different agencies responsible for marine problems.

The government at present seems to have put more emphasis on marine economic development and less on effective regulation of the environmental performance of offshore industry. Therefore we suggest the government should attach more importance to the regulation of the marine economy.

Here are our recommendations:

- Speed up the formulation of a national integrated marine development and environmental protection strategy.
- Establish a National Contingency Plan including the organizational setup for managing such a plan.
- Harmonize marine-related national environmental laws and marine environmental administrative functions.
- Improve legislation for marine environmental management.
- Strengthen law enforcement of marine environmental management.
- Enhance corporate environmental responsibility and improve environmental risk prevention capacity.
- Strengthen the capacity building of science and technology in marine environmental management.

The carrying capacity of China's marine areas, particularly the Bohai Sea, is rapidly deteriorating. The Bohai Sea ranks among the worst examples of degraded seas in the world. The reasons for this deterioration are well known: overfishing and pollution from a multitude of sources.

The root problems relate to lack of capacity, regulations, and enforcement. The result is lost ecosystem services and lost productivity. China is losing very large incomes it might have made from fisheries and aquaculture that cannot deliver high quality produce and, incidentally, are even delivering hazardous product. Just look at the incidence of shellfish poisoning in hospitals around the coast. In addition, coastal waters are not attractive to tourism due to harmful algae blooms. Human health is at risk. This means foreclosing present and future development opportunities: missed jobs, missed incomes, sector clashes, and conflicts between users.

The 2011 Bohai Sea oil spill illustrated insufficient laws and regulations related to the offshore sector, slow and inadequate response to a serious accident, confusion about who is in charge, and poor information from the operators to the authorities — and none to the public.

To strengthen marine environmental protection, a number of measures must be taken.

One government agency must be given overall responsibility for the environmental performance of the offshore industry. This agency must have enough authority and capacity to be able to check that regulations are always followed, do unannounced inspections of operations, and impose serious fines and/or close operations if necessary. Other government bodies should be obliged to collaborate with this lead agency.

The revision of laws and regulations is necessary so that environmental protection and the safety of personnel always take priority over other interests. The revision of regulations should make it clear that the operators always have full responsibility for any damage.

The revised regulations should compel operators to guarantee that the best available technology in the world is always used in exploration and production offshore, and that sufficient cleanup resources are on standby with trained staff. The new regulations should also make it mandatory for operators to immediately inform

the authorities in case of incidents or near incidents. With better regulations, fines, and other sanctions, operators would understand — as is the case in the North Sea, the Gulf of Mexico, and elsewhere — that they are fully responsible for always using the best available technology and for maintaining sufficient emergency response in preparation for the worst case scenario.

In case of accident, the operator must indemnify for all damage to the environment and to third parties. The operator must always give highest priority to safety and to environmental protection, ahead of economic interests. The operator must be fully transparent when it comes to incidents and near incidents and must report immediately.

Prevention of accidents must always be the top priority. But if a spill occurs, there will always be media attention, public outcry, and finger pointing. Companies as well as government agencies will always be criticized. The only way to deal with these situations is to be prepared. Have an oil spill contingency organization in place. Do everything possible to deal with the actual spill. Have lines of communication established. Be open, and inform and inform and inform, again and again, about what is going on.

Although we need stronger regulations and serious enforcement mechanisms, we also need positive goals that we can measure. How about the restoration of the Bohai Sea? We could close industrial point sources of pollution, treat sewage, phase out the overcapacity in fisheries, and so on. All this is possible. It has been done elsewhere, by countries economically weaker than China.

Special Policy Study on Regional Air Quality Integrated Control System Research

The study's Co-Chairs **Hao Jiming** and **Michael Walsh** presented the highlights of their group's report:

Air pollution in China is a serious problem. The concentrations of PM_{2.5} and of ozone in China are the highest in the world. The ratio of PM_{2.5} to PM₁₀ is high by World Health Organization standards, and this ratio is increasing.

To solve these problems, local responses won't help. Much air pollution comes from both local and regional sources. The regional sources are significant, which means we need to act at a regional level. In Eastern China, sulphates, nitrates, and

ammonia account for about half the composition of PM_{2.5}, and to confront these multi-pollutants at a regional level we need to act against stationary sources, mobile sources, and area sources in an integrated fashion. Only in this way can we really improve air quality.

On the one hand, China has made a lot of progress and has come a long way in reducing emissions intensity, that is, emissions per unit of GDP. But because the rate of growth has been so great, overall the emissions have actually increased, and dramatically. Although we saw a slight reduction during the last FYP in sulfur emissions — a good sign — all other pollutants are increasing.

The good news is that during the 10th and 11th FYPs China made great progress in addressing auto pollution issues. In ten years it achieved what it had taken Europe 20 years to do, moving from Euro 1 standards in 2000 to Euro 4 standards for light duty gasoline vehicles. Even though the growth in vehicle population has been astronomical, the overall emissions increase was constrained because of this strong program. If we look however to the future, such a program must be continued, because otherwise the domestic forecast growth will continue to overwhelm the existing regulations. If we consider even forecasts from the International Energy Agency, it is dramatic to see that the growth of China's freight and passenger traffic will surpass the growth in both OECD countries and other rapidly growing countries.

At the end of the last FYP, China was scheduled to move forward to the next stage of pollution control, but it hit a wall because of poor fuel quality. Fuels and vehicle emissions standards have to be treated as a system, as they were in 2000 when lead-free fuel was introduced to allow the catalytic converter. China has now delayed the heavy duty truck standards — National Emission Standards IV — two times already, and that has contributed significantly to the increase in NO_x that we have seen during the 12th FYP period.

In addition, other aspects of the motor vehicle sector need to be addressed. Refuelling at service stations is only marginally controlled in a few cities, and is now a higher source of VOC emissions than are tailpipes. In Shanghai and in Hong Kong, marine facilities are also dominant sources. Other off-road, construction, and farm equipment sources need to be addressed.

China has shown that for short periods it can deal with regional air pollution problems, such as during the Shanghai Expo, the Beijing Olympics, and the

Guangzhou Asian Games. But current laws, regulations, and organizational structures don't seem to allow those successes to become a permanent condition. So that is our challenge: to turn this into something we can institutionalize.

We have looked at how other countries have addressed this issue, and one of the key lessons is: this is an ongoing process. You have to establish your goals, determine your emission reduction targets, your control strategies, and your implementation program, and then evaluate and make adjustments as you receive more and better info.

Here are the group's policy recommendations:

Enhance legal authorities. This measure is needed to control PM_{2.5} and ozone and their precursors, and to address regional pollution and the major sources. It is striking that MEP does not have the authority to regulate fuel quality which is an important determinant of emissions from a variety of sectors, including the fuel sector. And we must increase the penalties for those who violate emissions regulations.

Improve institutional arrangements. MEP has multiple departments, including at least six responsible for air pollution control. But they are not integrated. No single entity has the authority and the responsibility needed to make it effective. The United States Environmental Protection Agency employs about 1400 people who worry about air pollution. In MEP we have maybe a couple of dozen, even though MEP deals with problems that affect more people and China has pollution levels much more severe than those in the United States. So more resources are needed in China. We believe there should be a dedicated atmospheric management department within MEP, as well as regional agencies. And we need an overall budget increase and a national clean air action plan.

Change the development mode. We have heard much about heavy industry, but it is dramatic when you look at the actual numbers: almost a five-fold increase in ten years in steel production, a tripling of cement, tripling of power generation. These increases in production create tremendous challenges from the standpoint of regional air pollution. We must move away from such high investment and consumption patterns, and away from the outdated production capacity of heavy industries. We must create new barriers for entrance into these heavy industries, and gradually locate these enterprises away from regions with the most severe air pollution problems.

Control pollution from coal use. Reliance on coal as a proportion of energy

consumption should be reduced by 3% to 5% per year. Where we do consume coal, we need to shift to state-of-the-art pollution controls, set regional caps on coal consumption, reduce the use of raw coal for residential heating and cooking, and apply the best technologies for end-of-the-pipe controls.

Strengthen control of mobile sources and fuels. Growth is almost inevitably going to be very high. Therefore we think that strict sulfur fuel standards need to be introduced in China. This is a cost effective approach to air pollution control. Also, tighter new vehicle standards are critical. These will have tremendous health benefits but also reduce black carbon and other short-lived pollutants that are critical from a climate standpoint. We need to control the VOC emissions from the whole system — not just the tailpipe, but the entire fuelling chain including the service station. We must promote public transportation but it must be clean and safe and optimize traffic management. Finally we must not forget the off-road sector that includes marine vessels, construction, and agricultural equipment.

Comments on the policy study presentations

The study group on marine challenges has stressed that the interaction between the oceans and land use mechanisms is very important. But does China have sufficient research capacities in these two areas — land use and ocean research — so that these kinds of interactions might be better understood and better controlled? The Co-Chair confirmed that yes, the group has been impressed by the research it received, and remains confident we have good knowledge of the relationships between drainage areas and what's happening in the sea.

The marine report offers many suggestions for handling oil spills. Here are three more: a) we should emphasize not only emergency response but also risk prevention, and in this area China has much experience, particularly in fire prevention; b) we need to “institutionalize” the way oil spill damage is measured so that our own short-term subjective human experience of the event does not disguise the actual scale of the damage; and c) we need to revise China's marine protection laws by removing contradictions within the legislation.

We should take care to mention China's non-governmental organizations (NGOs) in our policy recommendations. Note that the whole issue of PM_{2.5} was raised by NGOs. Although the United States embassy had been publicizing PM_{2.5} statistics for

some time, the matter would not have been included in Chinese government action if NGOs had not played a big role in promoting environmental awareness among the public. If this ally is overlooked, if the great power of NGOs is not utilized, we would see a situation where environmental protection is still being led by government and by business.

It is true that public involvement is absolutely vital, because with the support of the public we can do better. But the listing of PM_{2.5} among the pollutants happened not entirely because of calls from the public. The Chinese Academy of Engineering and the Macroeconomic Research Institute had already incorporated the WHO's guidelines. Starting from 2008, under the leadership of MEP, we revised standards for ambient air quality. It was made public on the MEP website and PM_{2.5} was already included. To include it in controlled pollutants is a step forward. Both the government and the public played a role in this.

When it comes to dealing with oil spills, the devil is in the details. It is true that there needs to be a single government agency to take accountability when the crisis happens, and that the operator needs to take accountability to manage the spill. But do we understand enough about all the conflicting requirements and priorities by other agencies so that these two so-called "single accountable" parties do not get handcuffed?

Dealing with oil spills is all about professional competence. When a spill happens, it is critically important to have the capability to manage it quickly. It is also important that the relevant government agency itself have the capability to assess the technical capabilities of those who need to have those technical capabilities. If you don't get this right, nothing will happen right.

The task force talks about the importance of safety as well as of environmental management. It is true: safety is the twin brother of environmental protection. If we don't do safety right, in the oil and gas business or in any other industry, we will mess up the environment.

Does California's broad range of experience in controlling VOCs apply to China? Indeed the study group did pay close attention to Southern California's practice in controlling PM_{2.5}. The team's international experts include a person from California, and the core members travelled to California to study on the ground. In fact, during the air quality group's next phase, control of VOC will be a key issue, and we suggest

that during the 13th FYP VOC should be listed as one of the controlled pollutants.

Item 6. Draft AGM Recommendations and Discussion

Draft recommendations for submission to the State Council

With Vice-Chair Børge Brende chairing, Chief Advisor **Shen Guofang** introduced the draft 2012 CCICED AGM recommendations. Each of the five proposed recommendations is followed by a number of items or components. The final version of these recommendations, incorporating changes made following this discussion, subsequently was submitted to China's State Council. That final version is included in this report as section III.

Recommendation 1: Enhance institutional and policy innovation and enforcement to promote practical implementation of ecological civilization.

- 1) Develop mid- and long-term plan for ecological civilization construction at the macro level.
- 2) Reform and establish institutional systems adaptable to ecological civilization with great political commitment and wisdom.
- 3) Promote integrated institutional innovation towards the direction of green and ecological transformation.
- 4) Promote comprehensive pilot demonstrations of ecological civilization.

Recommendation 2: Establish a balanced and green regional development strategy, with eastern region as a lead and western region as a focus.

- 1) Establish general national principle and strategy for regional development to form a broader framework of regional green development.
- 2) Develop sustainable urbanization plans, and establish urbanization modes adaptive to differentiated regional characteristics.
- 3) Strengthen policy enforcement and establish coordination and cooperation mechanism for regional development.
- 4) Develop regional environmental performance evaluation and assessment methods, implement accountability system.

Recommendation 3: Strengthen joint control of air pollution to improve regional air quality.

- 1) Integrate regional environmental capacity, optimize economic structure and layout, and establish new regional joint control mechanism.
- 2) Revise relevant laws and regulations to provide legitimate guarantee for regional air pollution control.
- 3) Strengthen pollution control and implement multiple-pollutant synergic control.
- 4) Increase investment and strengthen science and technology development, and implement national clean air action plan as soon as possible.

Recommendation 4: Strengthen marine environmental protection and construct marine power.

- 1) Speed up the formulation of national marine development and environmental protection plan.
- 2) Strengthen legislation, law enforcement and governance mechanism of marine environment management.
- 3) Establish national marine emergency response planning system for major environmental incidents.
- 4) Strengthen the supporting capacity building of science and technology in marine environmental management.

Recommendation 5: Establish long-term mechanism with environmental quality improvement and risk prevention as objectives to promote strategic transformation of environmental management.

- 1) Develop and implement emission reduction policies to ensure realization of environmental protection objectives in the 12th FYP.
- 2) Promote strategic transformation of environmental management to adapt to new demands of socioeconomic development.
- 3) Implement differentiated sectoral and regional total amount control policies.
- 4) Implement actions and management system with objective of environmental quality improvement.
- 5) Establish long-term mechanism to promote institutional innovation, develop mid- and long-term emission reduction targets and roadmap.

Comments and discussion on the draft recommendations

These recommendations come just after the 18th Party Congress and its emphasis on ecological civilization. Therefore it would be good if we can speak more to what that concept means, specifically, that the commitment to ecological civilization cannot stop at the border. Yesterday the World Wildlife Fund (WWF), with the Chinese Academy of Science, released its *China Ecological Footprint Report 2012*. This report indicates that China's total ecological footprint is now more than double the capacity of China's ecosystems to support, which means there is a huge amount of impact being exported. China's dependence on mines and fisheries and forests overseas is having large consequences for many countries. We need to build this into the concept of moving toward an ecological civilization — a recognition that how China invests overseas, the terms on which it trades, the conditions on which China's companies act overseas, all should also be an important part of our CCICED agenda.

Thinking needs to be done about how much can be accomplished by government decree and how much by “incentivizing” citizens and businesses. Citizens and businesses want a better world, but it is always easier if someone else does the difficult work. Thus there is a strong disposition to shift costs onto other players — usually, of course, onto the government. Regarding Recommendation 1, Item 3, there should be more specificity about the need for a genuine cross-government signup, because it is important that all government agencies have a common approach and understanding about what ecological civilization means. It is unfair to leave this all to MEP. Ecological civilization has to mean exactly the same thing in all ministries, and it's vitally important that MEP has the full support of all other agencies.

The government needs to develop a broad, long-term vision of what ecological civilization will mean, in 2020, or 2030, or 2050 — a longer time frame than the FYP. This vision must address the concept on a number of dimensions, and broaden as it gets further away. Engagement with the public about the vision is important to set the scene for lifestyle expectations and investment decisions. We need precise but coherent goals beyond the 12th FYP, to 2020 and 2025. Then we need to tackle “normal policy stuff,” that is, policy coordination across these goals so that macro, micro, economic, regional, social, and environmental policies actually align and contribute to one another. And we also need: the engagement of the public around the changes and the reasons for them; efficient instruments; program stability and consistency, so that people and businesses can make decisions; comprehensive, reliable, and transparent information; and an effective, skilled, and honest regulatory system. But we must begin with that light on the hill — the grand vision with the longer time frame.

The recommendations address many matters at a national level. But with regard to industrialization and urbanization in Central and Western China, a lot of change will happen at the county level. But the governance, monitoring, and supervision capacities of these county-level governments are very limited. We should be concerned about the controlling ability of county governments in the environment sector. While it is good to have national policies and frameworks, we also need to look at the local levels. What is happening at those levels will have a big impact on the environment in Central and Western China.

The draft recommendations read like a list of command and control measures, punishments, taxes, and so forth. But civilization also rewards incentives, and we are missing incentives in this list. Agents of change are usually businesses, the private sector, the public, and these agents will operate more constructively if they help prevent the accidents and the other problems we are concerned about. And prevention is always the result of incentives, not of punishment. So we have to include more rewards and incentives in this list of recommendations.

In China, at the local or provincial or city government levels, the single most important concerns of officials are investment, job creation, and wealth creation. We should bear that fact in mind when we aspire to give environmental or ecological progress the same level of priority. Therefore we need to put in place a rigorous MEP-supported performance appraisal system for government officials. At the beginning of the year it would be expressed in terms of target setting, at year-end in terms of performance appraisal. Compliance, execution, consequence management, and transparency should be expressed not just in terms of punishment, but also with rewards and incentives so that the relevant officials can be held accountable. Such a system will help align officials fully with what the government is setting out to do.

Item 7. Open Forum

Open Forum 1: Regional Coordination and Green Development

This open forum was co-chaired by CCICED Vice Chairperson **Achim Steiner** and CCICED Secretary General **Li Ganjie**. In their introduction they set out the framework for the discussion:

China needs development which is sound and healthy. We want to moderate the pace of growth a little, and improve the quality of the growth so as to achieve a green

transformation. The current international environment is complex and changing, and this has made our task more difficult. Regional imbalance is not unique to China but here it is even more serious and complex. A lot of initiatives have already been taken to address this imbalance, but to put all of them into practice will take time and effort.

We in the China Council have observed that China has achieved many transformations, in the economic sphere of course but also the sphere of sustainability and environmental protection, where China has seen new instruments, new markets, and new technologies. Yet at the same time, the era where some of these transformations have been “lower hanging fruit” is giving way to the need for deeper economic and structural transformation. For years China’s leadership has articulated repeatedly the need for balance. This afternoon we focus on the challenges presented by China’s regional imbalances, in wealth, income, opportunity, and ecological vulnerability. Such challenges are found in many countries but the context and magnitude of these challenges are unique to China.

We should also reflect on something peculiar to China – the ability to think in long-term horizons, both towards the past and towards the future. The timelines we sometimes use in our CCICED discussions transcend what we usually hear in daily life in other nations. China’s traditions and philosophy have as much bearing on these discussions today as do some of the technology frontiers and policy opportunities that we usually talk about. China’s ancient heritage and culture and ethics can provide some of the inspirational direction to guide us in formulating our advice today. Our societies will succeed or fail depending whether they address fundamental principles of living together.

The Co-Chairs then introduced the first of the leading speakers, **Erna Witoelar**, former Minister of Human Settlements and Regional Development in Indonesia. Here are some highlights from her talk:

The concept of sustainable development is great but it has been hard to implement a holistic approach in my country. Our government has been very “sectoral,” with people working in their own silos, so it has been difficult to combine the social, the economic, and the environmental pillars of sustainable development. With the concept of the green economy, however, it is much easier to mainstream environmental aspects into economic development.

It seems that green development is focused on land use and special planning,

which is where a lot of conflict exists, for example among conservation advocates, mining and oil and gas interests, and local communities. The good news about green development is that it produced the “green industry” movement: green technology, architecture, engineering, infrastructure, and so on. These innovations put the responsibility on ordinary people and professionals to live on a smaller scale, where things are a manageable size.

In Indonesia, we have a lot of challenges regarding land use. We have conflicts between national and local governments and also between government sectors, for example, public works versus the environment, mining versus forestry, and so on. There needs to be role-sharing between national and sub-national governments. Now that we are aware of ecosystem-based regional development, we can see that it is not in line with our habit of dividing our country into administrative borders.

Alas, the destruction is so much faster than the rehabilitation. We are frantically planting millions of trees each year but we can't get back to where we were. The replanting gives us a monocultural, man-made forest, short on biodiversity. We believe we should no longer “cut first, plant later.” We need to plan ahead to prevent bigger losses than what we have been doing in our current development.

We need special planning also to anticipate climate change; in fact we need a national action plan on climate change. For example none of our cities has at least 30% green open spaces; the maximum is around 17%.

Regional coordination among districts or provinces is vital in green development, because ecosystems go beyond administrative boundaries. In the case of river basins, for example, you can't stop the water at the boundary of the administrative region.

The eastern part of Indonesia is less developed than the west, and consists of thousands of small islands. But we keep making developments there that are more suitable for large islands. These buildings on small islands are on the wrong scale, and therefore uneconomical. So we should have a different approach to development there. In fact the eastern provinces are coordinating to advocate for building more ships, instead of more cars or motorbikes. For us, this is an unfamiliar way to do things, since we tend to think of our country as one nation, with a uniform mode of development. We like to go the easy way of having a single approach. So China is going in the right direction in moving toward a commitment to regional balance in development.

Simon Upton, Environment Director with the Organisation for Economic Co-operation and Development, spoke on the topic “Regional Cooperation and Green Development.” Here are some high points from his leading speech:

It is important to remember this: the challenges are so big we can’t afford expensive solutions. Cost is always an issue, and we cannot consider solutions so costly — no matter how beautiful they may be — that we can’t afford to implement them.

Incremental progress is not enough. Climate change modeling suggests that, as the world gets richer, per capita CO₂ emissions intensity falls. By 2050 everyone will be below the most efficient level today. But, in the process of reducing the intensity we’ve managed to double the overall volume of emissions. The point is that we need to do more than make some progress — we need to make a lot of progress.

The same point can be made about public health, in particular in terms of premature deaths from air pollution. By 2050 the number of deaths linked to ground-level ozone will have risen in every part of the world — even in so-called rich countries — as ageing populations can’t cope with the airborne pollution.

To begin to address these big problems, we need “joined-up thinking.” This means:

- We need to mainstream green into development and growth. Green thinking has to be integrated. For example, government ministries have to be talking to one another.
- You can’t manage what you can’t measure. This is true for household budgets as well as for national budgets.
- You must make decisions for the long term. China knows more about that than most countries do.

By 2050, 70% of the world’s population will live in cities. In thinking about how to make cities more compact, here are some key governance strategies:

- You need a regional, integrated, long-term vision.
- The vision must articulate the roles and responsibilities of all key actors and stakeholders.
- It needs good vertical and horizontal coordination.

- And it needs accountability, transparency, and reporting.

Once you build a city, it is there. It's hard to un-engineer it. Here are some key policy strategies that will head off lock-in:

- Set explicit compact city goals.
- Encourage dense and contiguous development at the urban fringes.
- Retrofit existing built-up areas.
- Enhance diversity and quality of life in urban areas.
- Minimize adverse negative effects.

And you will need indicators to help you decide whether you are moving toward a more compact city with a different environmental footprint than a large, outspread, unplanned one. We can apply these indicators to one sector, for example transportation, which is a key element in how urban formation develops.

We like to use the “avoid, shift, improve” approach. In the case of transportation, we *avoid* a spread-out design, plan for a more compact environment, and think in advance about options for public transport, including for bicycles. We *shift* people in a way that they are happy about the shift, from private cars to public transport. And we *improve* by introducing infrastructure to support less polluting alternatives, such as electric vehicles.

For strategic goal-setting you need integration — joined-up thinking — in all aspects, including social, economic, and environmental. Integration is the key to coordinate multiple stakeholders. That means getting together often with overlapping urban authorities, cities, municipal areas, and territories. These administrative bodies have boundaries, but citizens don't live within boundaries, they move across boundaries. So the people who manage the cities need to work together.

Among the enabling incentives we need carbon-pricing strategies and other policy instruments. Regarding emissions trading schemes, we expect to learn from China's experiments at the regional level. But this is complex stuff, and in some ways a straight national tax would provide an easier revenue source.

Then there is the question of bringing the finance sector onside with the big investments. If we aim to stop locking in the future around high carbon, we will be

making investments that will last 50 or 100 years. That requires innovative financial instruments with the same lengthy terms.

Human capacity is essential. In particular we need to build the capacity for doing assessments. There is no point having policies if you can't enforce them, let alone measure the results.

We also need to promote consumer behavior and an awareness of green issues. Cities are great for achieving that because they are closer to the people than is the government. Some exciting environmental innovations have been the brainchild of local people responding to local issues.

How much can government really do? We need to be humble about the limits what we can achieve, especially from the centre. Regional and local levels of government can be more effective. People who create structures that are resilient and that they live in and can maintain will stay there for a long time. We know plenty of examples of societies — such as Angkor Wat — that looked resilient once upon a time but which nature reclaimed.

Zhai Qing, Director General of Department of Planning and Finance, MEP, reported on plans and progress related to regional coordination in the context of the State Council's 12th FYP for environmental protection. Here are his four main points:

1) In implementing our strategy for protection of regional environments, we will have different policies and management mechanisms for different regions. For Western China we will give priority to the ecology, to enhancing the supervision of resource and energy development activities, and to enhancing and securing ecological services. For Northeast China we will protect ecosystems such as forests, and do corrective and remediation work for soil erosion and desertification, particularly in the granary belt. For Central China we will maintain the region's environmental and resource carrying capacity, improve infrastructure, and develop the level of urban and rural areas. For Eastern China we need to reduce emissions of pollutants and accelerate the transformation of the economic growth pattern.

2) We need to develop the national environmental functional zoning plan to promote environmental health and ecological security. This plan will involve management by zone and by category. In our initial thinking we have five zones: nature, ecological function regulation zone, food and security protection zone,

settlement development zone, and resource development and guidance zone. This year we developed technical specifications and rules, and in some provinces we did pilot projects.

3) We have been promoting the improvement of rural environmental services, for example, drinking water watershed protection. We encourage townships and large villages to develop centralized drinking water facilities, and smaller villages are encouraged to develop low-cost wastewater treatment facilities. We will also develop collection, transportation, and disposal facilities for rural residential waste. Already we have invested about RMB 30 billion, and 26,000 villages have benefited from the program.

4) We will develop an urban environmental master plan. The current plan focuses mainly on prevention and control of pollutants. It does not give much guidance about long-term development or city planning or limits to growth. Our master plan will help regulate the scale, size, and layout of cities. Ultimately we want to achieve an integrated plan that covers protection of the eco-environment, economic development, city development, and land use. Thus it will be a 4-in-1 integrated urban sustainable development system. We want to make sure that environmental protection is changed from passive to proactive. The current disconnect between environmental planning and other kinds of planning will become a very active integration.

Dirk Messner, Director of the German Development Institute, presented a leading speech on the topic “Low-carbon transformations — seven key elements.” These are the highlights:

The global middle classes are growing rapidly. In 1990 we had 1.3 billion people defined by the United Nations as middle class. By 2030 there will probably be 5 billion defined as global middle class — 80% of them in the non-OECD world, especially China and other parts of Asia. Thus we cannot just scale up the current growth and consumption patterns. We must find new types of consumption, new growth patterns, and new forms of well-being. Western China, for example, cannot afford to follow the consumption pattern we have already seen in Eastern China.

Germany has been making the most ambitious energy transition in the OECD. My country is abandoning nuclear power and increasing renewable energies in the mix to 80% by 2050. This is a huge social transformation. It goes beyond

technologies and includes consumption patterns and regulatory frameworks. China can learn a lot from the German experience, and I hope we can bring this issue into CCICED debates in future.

Finally, we must remember that we are under huge time pressure. If we cannot peak GHG global emissions by 2020, then we can't stay under the 2°C threshold. We all have to move forward much faster. China is an important part of this equation.

Here are seven elements of what a low-carbon transformation is about, and some reflections on what this means for China:

1) If you look at different types of significant social transformations — the abolition of slavery, the emergence of the European Union, “structural adjustments” in Latin America — you know the elements that drive these big changes:

- *Vision*. China is strong on this area. We have just been reminded of the capacity of the Chinese people and culture to think long-term.
- *Technology*. If you do not have the needed new technologies, you cannot solve the problems. Fortunately China does have low-carbon technologies.
- *Crisis*. Most big transformations are driven by crisis. We run into trouble and we change our policies. But we need to avoid a crisis this time, because if we have a climate crisis then we run into irreversible problems. Therefore we need to ignore this type of driver in this case.
- *Knowledge*. To take preventive action you need an alliance between policy-makers and researchers. New knowledge needs to be translated quickly into policy implementation.

2) Three sectors are key to a low-carbon transformation: energy, land use, and urbanization. These are where most emissions come from. All three are relevant for China, especially when China “goes west” with modernization. Regarding energy transformation, the potential for China to invest in solar thermal power is huge because the Gobi Desert is there. In fact, solar thermal power stations already in the area are competitive and have been supporting the mining industry. We are making progress in carbon efficiency also in the urban sector, but one area where we have made little progress worldwide is land use, particularly forestry and agriculture. So China should invest in low-carbon agriculture.

3) Prices for renewable energy carriers are going down rapidly. We calculate that if renewables comprise only 20% of the global energy mix, then you would see price

convergence with conventional energy carriers. China has been one of the drivers bringing these prices down, but China must make hard decisions now about whether to invest in these renewables or in fossil-based energy carriers in Western China. A low-carbon club of countries moving into this direction might be helpful in reaching this 20% tipping point as rapidly as possible.

4) Pioneers and change agents are important in any process of transformation. China is very good at learning from pilots, so the issue is how to scale up pioneering activities and learn from these pilots both within China and internationally. This is something CCICED already does, where scientists, researchers, and political decision-makers work together.

5) To achieve a low-carbon transformation, high upfront investments are unavoidable. But if you look to the whole investment cycle in the energy or building sectors, the investment costs for high-carbon and low-carbon energy solutions or building solutions are similar. If you decide to go low-carbon, during the first two decades you need upfront investment, but you gain with savings during the second part of the cycle. China however right now can afford to finance these upfront investments, whereas other world regions are troubled by debt. The structure of these low-carbon investments needs to be divided like this: 20% for energy infrastructure, 50% for buildings, transportation, and mobility, 15% for research and development, and 15% for land use and the industrial sector.

6) Low-carbon transformation means we are changing a whole system. We need to make progress in several arenas of change: the growing number of actors involved in low-carbon transformation, including companies, cities, and research institutions; the introduction of green innovations; shifting norms, values, and heuristics; new concepts of what economic development means; international learning processes (such as CCICED); and finally, new policy regimes. At this point we are all learners and beginners. Since we are all at the start of these low-carbon transformation processes, the possibilities to learn from each other are important. Transforming the system means we must foster “legitimacy for change.” And we must recognize that power dynamics will change with more low-carbon companies in the economy. Finally, we must demonstrate that a radical and ambitious low-carbon energy transformation — like Germany’s — is possible and can work.

7) Three mechanisms drive these arenas of change forward:

- We need transformational policies. Incremental change is not enough. We need to decouple, not just make efficiency gains. We need to find the right transformational policies for different sectors, regions, and circumstances.
- These arenas of change need to co-evolve, to be mutually reinforcing. For example, if we are making progress with new technologies it will be easier to change policy regimes. We need co-evolution or social interchange.
- To make this big transformation toward a low-carbon economy, we need a “social contract” among the main actors — the state, society, NGOs, the private sector, and research — that will serve to help stabilize these big change. China’s introduction of the concept of an ecological civilization moves exactly in that direction.

The open forum then heard from **Hu Angang**, Professor of Public Policy and Management at Tsinghua University. He outlined changes in China’s development during the past 30 years, and made these points:

According to the United Nations’ Human Progress Index, China in 1980 was in the lowest ranking group, by 2000 it had moved to the middle group, and by 2020 it should be in the higher level group. Not only is China progressing in absolute terms, but it is catching up with more developed countries.

The Human Development Index shows a similar advance. In the early 1980s, about 97% of Chinese people ranked low on this indicator, but by 2020 it is expected that a similar proportion will rank high. The life expectancy of Chinese people has been increasing along with their educational development. Even in Tibet, life expectancy is higher than in India. And access to education in Tibet has been improved compared with India, though Tibet still lags behind other Chinese provinces.

There are several reasons for these big changes:

- The growth of China’s economy during the last 30 years, when the income of Chinese people increased 10 times.
- Large-scale migration of the population, narrowing the differences among different parts of the country.
- The tax sharing system, which has provided a lot of dividends because of the transfer payments made by the central government to less developed areas.
- In Tibet and Qinghai, the progress that has been made especially during the past ten years.

What is the vision of China in 2020? China will become a higher medium income country, very similar to high income countries. Many better developed areas in China will become high income areas. China's Human Development Index, currently 0.703, will increase to 0.76. By 2020, China will be a well-off society.

As for future development, we need green investment in, for example, hydro power and other infrastructure. The investment in green development will increase greatly during the 12th FYP to RMB 3.4 trillion and it will further increase to about RMB 8 trillion. As the central government has said, lip service does not work. We need to take substantial actions and specific plans.

We hope these investments can have ecological benefits, for example, lead to better management of the environment. The number of people who benefit from green investment should be an indicator of the progress and efficiency of the policy. If the future RMB 8 billion green investment can be made, we need to calculate how it can benefit the whole population. Empty words will lead us nowhere. Only substantial actions can create substantial benefits.

The last of the leading speeches was delivered by **Veerle Vanderweerd**, Director of the Environment and Energy Group, United Nations Development Program. She reflected on the earlier speeches and made suggestions about revising the draft policy recommendations. Here are her four main points:

First, the earlier conference speakers all stressed that we need to find a new development path. We need transformations. How many times has the word “new” been used? As Vice Premier Li Keqiang noted, there is no precedent in history for what China is going through; there is no blueprint it can follow. Indeed China is probably the first country to try charting a way toward the post-consumption society — while at the same time having over 500 million people still in poverty, and while still having to industrialize in different regions.

All the speakers have highlighted the fact that the sweep of history that has taken centuries to happen in the rest of the world has happened in China only in the past couple of decades. All the problems are appearing at the same time. This is why when we talk about ecological civilization, we need first to define that vision. We have to identify what is this new development paradigm, what is this new era we are going into. Charting this new route is not only about deepening environmental management

and pollution abatement strategies. It is just as much about changing the economy, defining new ways of producing and consuming, and changing lifestyles.

The concept of economic progress has to go beyond GDP. We need different norms and milestones for sustainable economic success, and these norms and values have to incorporate environmental and social factors. In other words, for the growing economy to be sustainable and inclusive it has to become a *tool* for achieving ecological civilization. The economy is not a goal in itself.

Second, this new definition of progress means that we need a new way to measure it. An earlier speaker has said that “what we cannot measure, we cannot manage.” We must identify targets and goals for ecological civilization. In particular we need a new indication system. Ecological civilization must put people first. It is all about improving people’s livelihood — which doesn’t mean only improving their income. It means also improving their health, their housing, their physical environment, proper education, and security. GDP is only one part of it.

Third, one aspect that hasn’t been given enough attention is the crucial link between a sound environment and poverty eradication. This new economy should first focus on the bottom three billion and bring them into the economic mainstream. We need to give more attention to the woman who lives on one dollar a day. There are many examples — India, for example — which show it is possible. The first requirement is to give people access to water, sanitation, and energy. But then come more difficult issues: access to land, to microfinancing, and to legal recourse.

Remember that more than four billion people in the world have no access to legal recourse. When you are treated wrongly, how can you defend yourself if there is no legal system? How do we make sure the three billion at the bottom of the pyramid, or the 500 million poor here in China, have a say in the policy-making that impacts their lives? That’s why in the draft recommendations, when it says “green economy” I suggest “inclusive green economy” to make a plea for the three billion of the poorest people at the bottom of the pyramid.

Finally, I ask that in the policy recommendations we consider referring to Rio+20. From that conference we have an outcome document, a strong one, about integrating the three strands of sustainable development. We cannot say that environmental action and social action and economic action are unrelated. The name of the game is to change our economy and to better incorporate and address

environmental and social issues.

The Co-Chairs then invited speakers to deliver brief “leading comments.” The first of these comments was presented by **Tang Min**, Counselor of the State Council and Vice Chairman of the YouChange China Social Entrepreneur Foundation. Here is a summary of his main points:

Although I am new to the environmental area, I have a couple of suggestions drawn from my perspective in other fields of work.

First, I hope that information in future CCICED reports can be benchmarked or compared with other developing countries. Already some reports include comparisons between China and Australia, or the United States, or Germany. But China lags behind a lot of the practices and conditions in those developed countries, so those comparisons are not relevant or useful. On the other hand some developing countries are encountering similar kind of difficulties and challenges as we are. They already have found good solutions, their policies are being implemented, and their lessons can be useful to China.

Second, why do we have so many environmental issues? Because this is a typical case of market failure. People all want a free ride. China’s market economy is even more market oriented than in developed countries, because people are all profit driven. Local governments, entrepreneurs, individuals are all profit driven. Therefore if we do not take advantage of the market mentality and utilize market and pricing mechanisms, we have wasted a good opportunity. We can’t always rely on government actions or administrative orders.

How can we correct the current distorted market mechanism? In the United States, emissions trading is well developed, and such a system should be introduced to China. Energy pricing is another issue. If the energy price can reflect the cost and price of renewables, then the renewables will be developed well. We already use tiered, categorized pricing and tariff systems for water and power in the business sector, but can we extend that to the residential sector? The point is, if you use renewable sources you will benefit, while big users and big polluters would have to pay. We need “command and control” to some extent but we can also rely on market forces.

We must also consider public participation, public engagement. There is no need to mobilize people because the public in China is already concerned about the environment, about issues like PM_{2.5} for example. Already, the public is leading the government environmentally, because people want to enforce their environmental rights. If this problem is not well handled, we will see social tensions similar to what we have seen in China with land expropriations from farmers. We should learn from international experiences and prevent the problem from becoming worse.

How can we leverage this public force into green development and environmental protection? How can we encourage people to have positive and constructive participation in the environmental area? One way is by increased transparency. We already have some transparency, but for people to have more participation — or at least, not to panic — then we need greater transparency. We also need to present information in clear straightforward ways that people can understand. And we should take advantage of the new media formats which have already become an important means of social mobilization. Finally, we should work closely with environmental NGOs — the earliest NGOs in China.

Hau Sing Tse, Executive Director of the African Development Bank, offered these leading comments:

I well appreciate the discussion about what is green growth or green development, or “inclusive green growth.” In the African Development Bank we focus on how we do green infrastructure and on the private sector’s role in the process of making growth not only green but inclusive.

Earlier speakers articulated well the structural transformation that China is going through. On the question of regional strategies, however, I have a different take. I would argue that regional imbalances could actually strengthen how China will realize its ambition of achieving green growth.

In the west, the pockets of poverty are in the fragile areas which, at the same time, have the natural resources that can be exploited to fuel growth. Furthermore, the sharper the differences among the regions, the easier it is to target the eco-compensation, the fiscal transfers, and so on. It is important to understand the comparative advantages of different regions, but also important to understand their comparative disadvantages, because these facts will affect your policy choices.

Next, the Co-Chairs introduced **Li Xiaojiang**, President of the China Academy for Urban Planning and Design. Here are the high points of his remarks, which concerned China's counties and townships:

As we know, China's population and industries are concentrated in the coastal areas, along the main railway routes. Other areas are sparse. It seems however that things are beginning to change. Between 2005 and 2010, industrial development in Western and Central China accelerated. Also, because of the high cost of living in big cities, people are moving to smaller cities and counties. This is a new trend. To some extent Central and Western China are catching up.

We have a lot of small counties with populations of about 200,000. These counties house about 50% of the urban population — a different pattern from what the government had planned. Between 2006 and 2010 in the big cities there is negative population growth. However in small cities and counties there is not negative growth, which shows there might be a population shift.

So we face a lot of challenges. In the past we focused on the big cities. Now however we are also considering the economic development and needs of the small and medium-sized cities. This is because these counties and townships can help the development of the rural areas in China.

A lot of the resources, however, are concentrated in big cities, while smaller and medium-sized cities cannot get the resources they need. Now Hebei province has set a good example for us. They have been changing their allocation of resources — some for the big cities, others for small and medium-sized cities.

At the same time we are facing increasing environmental problems. In Guizhou for example you might find the coal, chemical, and other polluting industries concentrated mainly in townships, which means it may be difficult for us to control the pollution at this level.

To sum up, during this round of industrialization and urbanization, more attention should be directed to small towns and townships.

Siebe Riedstra, Secretary-General of the Ministry of Infrastructure and the Environment of The Netherlands provided the last of the leading comments. Here are

the highlights:

We are all pupils and all teachers. It's important to stress that because whenever we want to make decisions toward green development, it's a complicated step. We are asking for many big things — green consumption, green production, inclusive social development — and if you are a growing country with a lot of people, or a small country, it's a major challenge for you.

Green development calls for new instruments. We already have a long tradition of sanctions and stimulus — taxes for example — to motivate people to carry out new types of consumption or production. But we also need more participatory social arrangements. I believe in multi-stakeholder involvement — of civil society, enterprises, government, all those institutions.

It is important to give good examples to each other, to learn from each other, for example by practicing green development pilot projects. In the Netherlands we have had good results with multi-stakeholder projects that can be replicated anywhere in the world, involving waste management, electric-powered transportation, energy production from water treatment plants, and sustainable food consumption.

General debate and comments

China's entire coastline is ecologically deprived. Here are suggestions for two changes to the draft recommendations. In Recommendation 2, concerning regional development, I suggest adding: "In the coastal regions we must pay special attention to the marine ecosystem, which has very high value but which is vulnerable to human activities." And in Recommendation 4, I suggest adding: "The large-scale rapid pace of land reclamation activities on the coast adds to the tremendous pressure on the seas."

These are good recommendations but I hope they can be strengthened because the current development of Central and Western China is not "normal." It is growing too fast, and different sub-regions are competing in terms of the pace of growth. Some places want to double their economy in five years, and bring the annual growth rate to 15% or 20%. Some Western China regions aspire to achieve the same per capita GDP as Eastern China by 2020, which is why they have to grow so much faster.

A lot is happening in Western China's urbanization. They are building industrial

parks that are useless, and properties that are not occupied, and unnecessary infrastructure. Their GDP is driven by high investment, and by energy and resource industries. They are creating better investment conditions but at a cost in resources and environment. They are trying to compete against Eastern China, producing a high growth rate with undesirable consequences. It will not be beneficial for green development if all regions want to grow by 13% or 17% for a long time. There is no scientific or economic basis for that. It is just not possible.

We need an indicator system more in line with concepts of scientific and green development. Although the development plans for Central and Western China talk about other indicators, on the whole people are basically competing on the basis of GDP. That is the reality we are living with. We need instead indicators that measure human capital, natural capital, living standards, employment, education, and health and medical services. Such indicators may help reduce people's motivation to be single-mindedly focused on GDP growth.

We need to push beyond rhetoric and talk about concrete guidelines, about practical policy frameworks, so that the process will operate to actually guide and produce the green development we want. In this light it is worrying that we are not establishing a policy for guiding development in Western China. We hear a lot about the region being relatively pristine and therefore having a tremendous capacity to absorb environmental insults. But given the excessive public investment plus the extractive industries, there is need for a dynamic policy framework, one that can adjust to changing economic conditions and levels of investment but that continuously provides environmental benefits. One example of such a framework is an American policy regarding air quality management called Prevention of Significant Deterioration, or PSD. It is used to evaluate the sanctioning of new emissions sources in areas where the air quality is actually quite good and you want to preserve that, but at the same time you want development to occur.

The focus on energy, land use, and urbanization that we heard about earlier would give precision to that kind of framework, but we also need to look at traditional air and water issues. In Western China water is in short supply. New industrial development will drain supplies that are already stressed by climate change and overburdened by industrial discharges. You need EIA and sanctioning processes that address the uniquely sensitive nature of those ecosystems. You need to find a way to maintain those ecosystems as opposed to degrading them so that every place is not only equal in per capita GDP, but also equal in per capita environmental suffering.

CCICED's recommendations to the State Council are usually drafted in general terms, lacking details. They are styled this way for several reasons. We do not want CCICED to drift away from a policy focus into becoming a body that only recommends technology. This is why we allow longer research reports, where writers can address issues with as much detail as they want. But when we get to the point of making recommendations, these must be understandable to senior decision-makers who may or may not be knowledgeable in the technical field.

Sometimes it is necessary and valuable to highlight the technical side of things, for example, with the reports on PM2.5 and the Bohai Sea. Unless you understand the technical nuances — say, of how smog forms — then you won't understand the problem. In the case of both those special policy studies, the writers were able to make a highly technical field understandable and also explain clearly how laws would have to be changed. For example, the PM2.5 report points out that current air pollution laws are already obsolete because they focus on problems of the past such as coal burning and SO₂. And the Bohai Sea study showed the fragmentation of authority and the regulatory framework that is insufficiently robust in the face of intensive development and emergencies.

Also we must remember that CCICED's recommendations are only one part of a large conversation that is happening in China. We are communicating with the premier, and at that level the Council does not have the final say. Its function is more to orient the conversation. But there is no doubt that the task force reports — the substance of the work — will live on well beyond the presentation of the recommendations.

Clearly we have to focus on the reality of implementation. That means in future we must consider matters below a national level, even to sub-regional levels, for example as with the Bohai Bay study. Even though it concerns a small area of China, the issue is a huge and difficult challenge, not so much a technological challenge as a behavioral and institutional one.

An important factor in green development will be the strategy for the auto industry, which has grown very fast. Some forecasts say that eventually there will be 500 million autos in China. The problems this creates will not simply be environmental. The issue is also energy security — how can we supply power to these cars? It is about land use — how do we build roads. And it is about the planning and layout of cities. So we need to look a more integrated approach to developing the

industry. This issue should be included in CCICED research, and soon. If we wait until the number of cars reaches 300 million, it will be too late.

Regarding the control of PM2.5 the State Council has already approved an integrated strategy on pollution control — but it is a plan only for the 12th FYP period. We must have an even longer-term plan. MEP and the Chinese Academy of Engineering should work together on a strategy, so that by 2030 we can bring up air quality air in China to a higher level.

The starting point for discussion about the modernization of Western China is how to avoid prolonging the current growth pattern. It might happen that old, dirty industries will be driven toward the west because employment and poverty are issues there. But prolonging the old development pattern in Western China needs to be avoided. Three principles are key:

- *Avoid lock-ins.* During the next ten years key decisions will be made regarding city planning, energy, transportation, and other kinds of infrastructure. These should be green decisions.
- *Leapfrog.* Instead of copying the Eastern China development paradigm, Western China should leap over that mode and embrace a new, green paradigm.
- *Invest in knowledge.* Universities and other knowledge infrastructure helped drive modernization in Eastern China. These knowledge structures are still missing in Western China.

What China is doing now is important and relevant for many other countries. For example, what is happening in Eastern China is relevant for the OECD, and what is happening in Western China is relevant for many developing countries.

In the draft recommendations, the conceptual framework for green development still fails to sufficiently link poverty and the environment. It doesn't recognize the relationship between poverty and the lack of clean water, air, land, and so forth, or the fact that new green industries can boost employment.

We need more research on differentiated industrial, fiscal, and taxation policies for different regions. Xinjiang region, for example, has limited water but is rich in

other natural resources. Therefore we must have strict rules to protect the water but for the development in other areas probably we can apply looser or preferential policies.

We have been bringing forth new concepts, novel ideas, but not much related experience, whether in China or overseas. Therefore we should have pilot or demo projects before we try to introduce those new ideas everywhere. MEP already puts more focus on cases and pilot projects. In other words in addition to the macro policies we should also make efforts at the mezzo and micro level so we can identify the strategies that suit the characteristics of China.

We have heard many terms: transformation, ecological civilization, green development, the green economy, and so on. Clearly we are at a moment where the drivers for change are unusually acute, both environmentally and socially. The convergence of the environmental and the social in terms of changing economic policy paradigms is something that both the Party and academics have recognized and is finding its way into policies.

The regional imbalance conundrum is acute. In some ways China is a mini-reflection of the globe today, given the enormous imbalances in economies. Maybe China is actually pioneering this transformative approach to deal with inequities or inequality or imbalances. In the formulation “the east leads but the west is the focus” the key question is: does China’s west follow China’s east, or does the west invent its own development model? If the competition is only GDP versus GDP, then Western China is perhaps heading for a serious ecological and social crisis.

Constantly we have heard the appeal for integration. You have to integrate these concepts because only then can they be transformative. You can’t solve economic problems in the environmental domain alone, and you cannot have economic policies if you are unable to maintain the natural foundations. The degradation of ecosystems is a great cost to China’s economy. It is through integration — sectoral linkages, rural-urban linkages, or public policies and markets — that this problem will be addressed.

How to implement green development in Western China? What are the tools? Many countries, developed and developing, have experimented with fiscal transfer mechanisms to deal with regional imbalances. Also we have the notion of the social contract, and public awareness, and information transparency — all these are

ingredients that may help China translate its vision into a practical toolbox that it can deploy. But what is the strategy for a region like Western China, because the concept of green development means there has been an evolution from the model applied 20 or 30 years ago in Eastern China. So the assumption is already in place that something else must drive that development.

Open Forum 2: Strategic Transformation and Green Development

This open forum was co-chaired by CCICED Vice Chairperson **Børge Brende** and CCICED Deputy Secretary General **Xu Qinghua**. In their introduction they suggested three points for discussion during the session:

- How can the transformation toward green development be given the same value and priority as other elements in a moderately well-off society?
- How can green development best help to narrow the wealth gap between richer and poorer in China?
- What are the most significant challenges to be faced in constructing a new green development governance model appropriate to China's condition?

They then introduced **James Leape**, Director General of the World Wildlife Fund. Mr. Leape delivered a leading speech on the topic "Towards Decoupling Growth from Resource Depletion — Strategic Transformation for China." Here are the highlights:

As a global society we are living as if we have two planets to support us. We already use 50% more resources each year than the earth can sustainably provide. We must recognize the growing significance of China in that overall picture. Five years ago, the China Council commissioned the first-ever analysis of China's ecological footprint, and yesterday we released the third edition in that series, the *China Ecological Footprint Report 2012*, prepared by the WWF in collaboration with the Chinese Academy of Sciences and other partners.

It tells us that China now has the largest ecological footprint of any country in the world. This is in part a factor of the size of China's population, but also a factor of the rapid growth in consumption per capita in this population. China's per capita biological capacity — how much biological resource there is in the country to support development — has remained relatively constant since 1960. At the same time China's share of global population has actually declined slightly. But China's ecological footprint shows a strong rise. Although China's population is 20% of the

global total, it provides 25% of total footprint.

The components of that footprint are the amount of land converted to cropland or to grazing, or harvested for timber, and so on, but one component stands out — the rapid increase in carbon emissions, especially in recent years. From 2003 to 2008, carbon footprint grew 76% so is now more than half the total footprint.

Another factor is the unfortunate decoupling of efficiency and consumption. Even though China's production efficiency has been rising, consumption has been rising more quickly. Thus the use of resources rises more quickly.

China's per capita footprint is still significantly lower than that of other industrialized countries. For example, it is less than one-third the footprint per capita of the United States. But China's per capita footprint already exceeds the earth's ability to sustain it. If everybody lived as the average Chinese person lives today, we would still need more than one planet to support us. China has already surpassed sustainability, even if it still lags behind industrialized countries.

The challenge before us is pressing. The fact that China's ecological footprint is 25% of the global total, that its footprint is more than twice its own biocapacity, and that China is using more than twice as much resources each year as its own systems can provide, all mean that anyone can plainly see the depletion in China's own ecosystems, but also mean that there is growing pressure on ecosystems around the world from consumption here in China.

The transformation that needs to happen starts with valuing natural capital — with recognizing that future prosperity depends on natural capital which is the foundation for the economy. For example, after the 1998 Yangtze basin floods, China set about restoring wetlands and lakes in that system. China worked with governments and international corporate partners to restore 300,000 hectares in the middle of Yangtze basin. That restored area has benefited local communities in terms of agriculture and fisheries, but also in terms of flood absorption capacity equal to more than half that of the Three Gorges dam. This is natural capital — recognizing that healthy lakes and wetlands have direct value in supporting the economy — and that recognition is fundamental to thinking about the transformation that has to happen.

A second dimension of this transformation is measuring progress. Economic and government decision-making will be driven to grow GDP, but we have to get beyond

this. We have to find new indicators that measure what really counts — to measure progress towards an ecological civilization. A few weeks ago, jointly with the China Centre for International Economic Exchanges, WWF released a first attempt at a “green economy indicator system.” This is about bringing green into GDP, bringing social and environmental sustainability into our calculus of national accounts.

One idea that China has pioneered in recent years is “drawing red lines” around arable lands, that is, limiting the total conversion of arable land around the country. We need to do the same thing with ecological assets. It is time to draw ecological red lines to make sure that important ecosystems and ecosystem services are protected as development goes forward.

Another dimension of the challenge is consumption. China’s large footprint comes in part from a drive toward an increasingly western pattern of consumption. Part of the challenge is to bring back the bicycle — to bring back forms of urban transportation that are more benign than the traffic jams you see across this city and other cities in China.

It is also a matter of diet. If current trends continue, the global footprint by 2050 will be the equivalent of three earths. However, if we make dramatic improvements by introducing renewable energy and by reducing carbon emissions, but we continue to eat meat, we will still need the resources of more than one planet. It will only be by reducing our meat consumption — eating the way Malaysians do — that we have hope of reducing the world’s ecological footprint. Collectively as a global society and also here in China we need to be aware of the impact of meat consumption on our sustainability.

China’s strategic transformation is of course about what happens here in China. But it is also increasingly about how China is engaged overseas. China is an important investor in many developing countries, and for many commodities China is the world’s biggest market. So China can play a huge role in shaping the course of development worldwide. In some regions, China’s investment has become so large that development in those regions is actually tracking the health of the Chinese economy. In other words, what happens in Africa reflects what happens in China.

China’s cooperation with countries in Africa and in other regions is important for their ability to build ecological civilizations in their own nations. Therefore, bringing the idea of ecological civilization into development assistance policy, into China’s

investments around the world, is crucial. It is not just about what the Chinese government does. It is also about what Chinese business does.

Increasingly we have global norms defining sustainability in agriculture, commodity trade, and other sectors. The Forest Stewardship Council is increasingly becoming the global norm for sustainable management of forest resources. We have a similar system in place for palm oil, which is the main driver of forest destruction in Southeast Asia. More than 13% of the palm oil market is now covered by a sustainable certification regime.

Major global corporations are now stepping up to these systems. 57 of the world's largest brands have now committed to eliminating deforestation from their value chains by 2020. They will source certified sustainable supplies of pulp and paper, timber, palm oil, soy, and beef, the biggest drivers of forest destruction in the tropics. You now see the ten largest retailers in China signing up to begin to look at this challenge — to look at the role they need to play in sustainability. The private sector has a huge role to play. Both global actors and Chinese companies are part of helping to build an ecological civilization in China and in the countries where they draw their supplies.

The Co-Chairs introduced **He Jiankun**, former Executive Vice President, Tsinghua University. His leading speech addressed the topic “Strategy Transfer of Low-Carbon Development in China.” Here are the main points he made:

China's economy faces incredible pressures in transforming to a low-carbon development model. Over the past 20 years China has made a big effort to reduce carbon emissions. Since 1990 energy intensity per GDP in China has declined by 56%, and CO₂ intensity per GDP has decreased by 58%. However, total energy consumption increased 3.5 times, because GDP grew 8 times. Coal production has reached 3.5 billion tons — which exceeds what our environment can sustain — and the proportion of imported oil has reached 55%. Our failure to put limits on our use of energy is creating extremely severe challenges to our environment.

Under the Durban Platform to address climate change and to keep global warming under the 2°C limit, all nations must enhance their efforts to reduce CO₂ emissions by 2020. Total CO₂ emissions in China are about 25% of the world total, and are growing quickly. Therefore it is imperative that low-carbon development

should be put into place in China.

It will be necessary to coordinate domestic and international issues, short-term and long-term, and national and regional situations. By 2020, CO₂ intensity per GDP should decrease by 40% to 45% compared with 2005. Because of China's unbalanced growth, the eastern areas are more developed and are growing faster. It is important for us to hasten the transformation of the model so we can achieve our CO₂ emissions peak targets in the eastern cities around 2020. But China will pursue these controlled objectives in a gradual way.

Our medium and long-term energy strategies will be transformed from traditional security supply, and we will guide energy demands. The 12th FYP has already proposed the rational control of energy. New and alternative energies should be used to enhance our energy portfolio now. By 2050, the proportion of new and renewable low-carbon energies should be about one-third. This will make it possible to reach the peak energy demand faster, but consumption will continue to grow slowly. We hope that gradually this demand will be resolved by non-fossil fuels, so the use of fossil fuels will reach a peak and then gradually decrease.

To meet these goals, China must transform to an industrial system characterized by low-carbon emissions. It must first achieve a peak of energy consumption and carbon emissions in industry. To achieve this target, energy consumption in industries must steadily decline. Communication, transportation, and construction will probably continue to have energy consumption, but we hope we will be able to depend more and more on new and renewable energies.

Accelerating the transformation of this pattern of development will be key to achieving low-carbon development in China. We need to change the mode of economic growth, and to expand final consumption from investments and exports. The rapid growth of investments stimulates infrastructure construction and industrial capacity, which encourages rapid development of energy intensive industries. This will adversely affect our situation, so we need to adjust the industrial structure and reduce the energy intensity per GDP. If we can reduce the share of investment in GDP by 1% and increase the share of final consumption in GDP by 1%, it will contribute to declining energy intensity per GDP by 0.45%.

So, in order to define the position of low-carbon development in our overall development strategy we need during the next 20 years to have a peaceful and

positive international environment. China will then be able to accelerate its transformation model to become a greater economic power. It will change from a society that is resource-dependant and given to extensive expansion to a technologically innovative economy. Instead of blindly pursuing an economic growth rate there will be greater focus on the quality and efficiency of this growth.

The high-carbon development path characterized by copying and pursuing and chasing others will change to a low-carbon path characterized by independent innovation and green growth. So, we need to strengthen the construction of our legal, fiscal, and financial policies in order to support low-carbon development.

Next, the Co-Chairs presented **Roger Beale**, Commissioner of the Climate Commission of the government of Australia. The topic of his leading speech was “Strategic Transformation and Green Development: a Critical Decade.” Here are the highlights of his talk:

This is a critical decade for China and the world. If China fails to cut air, water, and land pollution it will condemn another generation to chronic health problems and to shorter lives than they need have, and reduce its capacity to feed itself.

Environmental degradation is already a large drag on China’s national GDP and a threat to social harmony. If we fail to move very soon toward a low-carbon economy, in China and abroad, it will be very difficult to keep within the agreed 2°C guideline on global warming. Investments in the next decade must be able to survive a low-carbon future or run the risk of being made redundant long before the end of their engineering life.

Thus, this is a critical decade. The decisions we make this decade will cast long shadows into the future. To make the wrong decision would be a great economic waste as well as delay the achievement of an ecological civilization. Achieving a moderately well-off condition for China’s population by 2020 and through to the 2030s will depend on green development. This is vital to a sustainable improvement in well-being.

The good news is that we are seeing great progress in the 11th FYP, and the 12th FYP raises our ambition in tackling these problems. But it is important to embed green development and ecological civilization as a goal into a longer time horizon,

looking forward into the 2020s and 2030s.

The critical challenge for this decade is to embed institutional change to ensure that these policy objectives are delivered efficiently and we enter the next decade on a trend of accelerating environmental improvement as well as improved living standards. The key strategic transformation is to mainstream green growth into the economy, the bureaucracy at all levels, and the culture so that it becomes a natural part of growth and improved living standards.

I will focus on climate change from an Australian perspective, as an example to bring out the key themes.

If we are to stay within the 2°C temperature increase guideline, globally we need peak emissions at around the year 2020, and then a decrease at around 10% per annum, and be virtually carbon free by 2040 to 2050. This will give us a two-in-three chance of achieving the objective. At the moment we are overshooting this target.

Currently, emissions are growing at 3% per annum with China responsible for 80% of this growth. If this situation remains unchanged, the world is heading for 4°C to 6°C warming by 2100. That will be bad news for all of us.

What does that mean? It means that globally we will have to start to reduce total emissions rapidly. It means that China's emissions must peak at some stage in the decade ahead or early in the 2030s, and that by 2040 we must be on a track that is much lower.

So, the investments we make and that China makes during the 12th and 13th FYP will need to be able to operate in an environment of significant carbon constraint. This is particularly important for long-lived assets in the power, transportation, and infrastructure sectors.

If these assets are heavy greenhouse polluters they are likely to suffer early closure or severe restrictions. Institutional arrangements — planning decisions, regulatory requirements, market signals and above all a consistency and sustainability of policy direction — are essential if wasted investments are to be avoided.

And it is great to see that already China is not just thinking but acting on low emissions investments. China is already leading the world in many of the sectors of

renewable energy. It is important for me, as a member of Australia's Climate Commission, to be able to tell the Australian public what China is doing, and I know this is true around the world. We need to keep up with China. China is not acting alone but it is becoming a very important power in renewable energy.

For China this makes commercial sense. The countries that act and invest now in clean energy and transport will inherit the future. But it also has a global impact — the cost of solar PV panels has fallen by 75% over the past four years in Australia, and 45% over the last two — and much of that is due to the influence of China.

China might play a similar role in wind as it builds under licence. And, providing that its rigorous safety standards are maintained, it might similarly be able to reduce the costs of nuclear power as it builds the newest and biggest fleet.

This isn't good just for China. The reduced costs of renewable energy have helped the world to meet its renewable energy and emissions targets, and action feeds back into global negotiations.

We will only build an agreement on the back of broad scale domestic action across the world. Action builds trust and the domestic confidence that goals can be achieved. Trust and confidence underpin productive negotiations. We simply cannot wait for an agreement in 2015 or 2020; we must all act now to build the base for lifting the ambition of those future agreements.

Both the China and Australia experience suggest certain measures we need to take.

We must get policy coordination right. Climate must be integrated with the other arms of the green economy — micro- and macro-economic growth, the restructuring of the economy away from export-oriented high-polluting industries toward consumption, energy policy, efficient energy supply markets with effective price signals, support for vulnerable people and regional areas, and urban planning — are all vital to reducing carbon footprint while boosting economic efficiency and social harmony.

These policies must be coordinated right across the board. Using carbon prices, trading, or taxes will only work if price changes are allowed to actually flow right through to final consumers who then change their behaviour and make choices.

We need clear agreements about responsibilities for measures and they shouldn't conflict with each other. We need the right policy instruments. We will always have a mix of regulatory requirements, government subsidies and investments, and market signals, but it is important that they do not contradict each other. They should support each other.

We have to integrate climate adaptation policies into broader policies to deal with or avoid natural disasters and to include planning, infrastructure investment, and the development of adaptive markets such as water trading and insurance so that you get the maximum amount of autonomous adjustment and adaptation to climate change.

We need program consistency over time. This has been an Australian failure. We have gone from policy A to B to C at a bewildering speed, which has made it hard for businessmen to make decisions and not get burned.

Finally, you need good scientific and administrative information, to underpin all these efforts. And you need good, honest, and capable regulatory systems to ensure that we are able to deliver what we are aiming to do with consistency and rigor.

In Australia we've learned many of these lessons the hard way by making costly mistakes, and like every other democracy we go on doing it. But if we can get this right, then this dream of an ecological civilization — which I think of as man living in harmony with man, man living in harmony with nature, and man living in a way that preserves the opportunities of successive generations — will be capable of being delivered.

Next, the forum heard from **Cheng Lifeng**, Director General of the Department of Environmental Impact Assessment, MEP. His leading speech described the role of EIA in China's environmental management:

Advancing ecological civilization and building a beautiful China is the mission of the environmental protection community. We must implement the 18th Party Congress policy, to engage in green development, a circular economy, and low-carbon development. We must protect the environment and advance economic development at the same time. We should reverse the trend of ecological degradation and speed up the transformation of the economic growth pattern.

Green transformation is a key link in our economic transformation. In particular, EIA is the core of our environmental management system. It must be taken seriously as we promote green development in China. From four perspectives, here is how EIA promotes green development

- At the national level, EIA should be a key indicator in making important regional development decisions. We have accomplished EIA for five major regions in China, and next year we will assess ten industries in Central China. We have analyzed the ecological capacity and assessed possible medium- to long-term ecological and environmental risks of key industries. We propose solutions and the results of our research have become an important reference for making major national and regional strategic decisions.
- At the regional level, EIA must be used to change our mindsets. We must integrate EIA into planning for regional development, so that there will be scientific and reasonable urban zoning and agricultural and ecological layout. EIA should be used to help promote balanced development of China's population, resources, the environment, economy, and society.
- At the industrial level, EIA must be an important factor in overall control over the location, layout, structure, and scale of development. In this way the concept of the circular economy can be promoted and we can realize the dual achievement of energy efficiency and emissions reduction. Already we have barred industries that are energy intensive and that have high emissions.
- At the institutional level, we continue to implement a policy that no new polluting projects should be approved and that existing polluting projects must be brought under control. We have addressed a number of important issues that people are concerned about. Despite its fast economic growth, China has actually made progress in environmental quality. EIA management at the source has played a big role.

Now, China has entered a critical stage for building a moderately prosperous society. In all respects we are speeding up the green transformation and building a beautiful China. We must focus on the following:

- To strengthen the role of EIA in overall decision making, we should continue to deepen the role of EIA in planning and in strategic decision making, and pay more attention to the overall impact on regional ecological systems and on people's health. We must give closer attention to the coordination of economic, social, and environmental benefits. And we should promote the reasonable layout, location, structure, and scale of major land development projects.
- We must strengthen the role of EIA in macro-economic regulation. In light of regional development strategies and functional zoning, we must promote the role of EIA in the development of Western China and promote that region's ecological services. In Northeast China we should speed restructuring in old industrial bases and close backward facilities. We should support eastern regions in disseminating advanced techniques and skills for preventing and controlling pollution. And we must ensure that we will not exceed the cap for pollution control.
- Finally, we should promote democracy and transparency in EIA, strengthen the legal system and revise environmental laws, and toughen penalties if projects advance without EIA. We must also ensure the public interest in environmentally sensitive projects. There should be transparency in government information. The public should be allowed to take a bigger role. We should have strict control over market access. And we should coordinate regional development and environmental protection so that we can reverse the trend of ecological degradation and create pleasant living conditions for people.

The Co-Chairs presented **Ashok Khosla**, Chairman of the India-based think tank, Development Alternatives Group. He delivered a leading speech about environment and development issues that are common to India and China:

We are in the middle of massive change. During the past 50 million years things have not changed so fast as they are changing now. The loss of species today is going at a rate faster than since the dinosaurs disappeared. We are also losing energy resources, fisheries, and land to soil degradation, and we are losing fresh water resources. China and India are both under all kinds of stress, some physical, some economic. Agricultural productivity is expected to fall somewhere between 15% to 50% by 2080. And consider the vulnerability of areas to floods and landslides, issues

related to labor productivity, air pollution — all these are massive problems threatening life everywhere.

Food prices were steady for many decades, but all of a sudden in recent years they have been increasing. We know this is happening because countries have been buying land abroad. Between 2001 and 2012, overseas buyers bought more land than the area of Great Britain.

Similarly, commodity prices are going up after decades of being steady. And look at all the natural disasters, the exponential rise in hurricanes and typhoons. It is no wonder that the global economy is a mess.

Interestingly enough, we talk a great deal these days about human well-being, climate, and ecosystems. But 20 years ago these issues did not exist. Perhaps in the coming decade there will be new issues that we have never thought about. This means we now have to develop systems that can deal with surprises, and not just the old issues that we inherited from our forefathers. We must be prepared and we must make our systems resilient.

China and India have some similarities. Their populations are huge. India is only one-third the land area of China, but the two countries' forest cover and deserts are similar. China has about 400 million people who earn less than \$2 a day, India 600 million. These very large numbers of people were left out of the economic progress we have seen in both China and India. One of the problems we have not dealt with during the first four phases of CCICED is this issue — that there are very large numbers who have been neglected and forgotten.

100 years ago tigers were everywhere. Today you rarely see them in the wild. Their numbers are decreasing rapidly. In India there once were about 100,000 tigers. Now there are fewer than 2000. In another five or ten years there will be none. Worldwide there are twice as many but they also will have disappeared by 2025.

So, we are basically living on a planet which is in fever. We all recognize there must be fundamental changes in lifestyles, livelihoods, consumption patterns, and production systems. We need a contraction, and also a convergence, a convergence between people who use too many resources and people who use too few.

The distribution of global income today leads us toward a number of priorities. We must maximize human well-being and minimize resource consumption. That

means we need to optimize the resilience of our economic and ecological systems. The concepts we need to absorb are efficiency, productivity, conservation, and dematerialization. These ideas can lead us toward genuine, absolute decoupling of resource use from GDP.

The world is at risk from two “diseases.”

One is “affluenza.” It is a terrible, terminal disease. Affluenza may feel pleasant for a while, but eventually it destroys you. People at the top live well. A typical German family, for example, spends US\$ 520 for food for one week. According to the European Union, 40% of this food is wasted — and 17% is thrown away unopened in its original packaging.

But affluenza involves a lock-in, an investment that may lock us — for decades or even centuries — into unsustainable patterns: soil erosion, pesticide runoff, mining inefficiencies, production leading to huge quantities of pollution, logging and land clearing, rapid urbanization, exploding resource use.

But there is another disease, called “povertitis.” This one afflicts a large number, the 50% to 60% of people who are at the bottom end of the scale. They have their own kind of “efficiencies” — a typical family in central Africa spends US\$ 5.10 for one week’s food. The environmental result of that kind of poverty is often desertification. So, both rich and poor destroy resources in ways that are not acceptable.

We have to deal with both these diseases, and fast. But that requires planetary medicine. It requires us to look at new ways to do things. The only way out of this is to change our societies to make them more just, and more green.

We must rethink national development in order to adopt new strategies for materials use. We must invest in people, in nature, and in global security. We can work with the ideas from the Club of Rome on “factor five” reduction of materials use and through technologies that are already available.

For example, the New Delhi headquarters of my own company, Development Alternatives Group, is probably the greenest building in the world. It uses virtually no original material, and is constructed mostly of mud and industrial wastes, including fly ash from power stations. This is a very nice building, and many multinationals want to rent space in it. But it is a totally different approach to the use of materials.

In all our countries we need to re-examine what it means to industrialize. We got carried away by industrialization — but classic industrialization is no longer sustainable. We need to create products that everyone needs, and jobs and livelihoods, and we need to conserve our resources.

Instead of machines, we must use nature to do our work for us. The most important thing that nature does is teach us. The so-called “blue technologies” such as biomimicry can transform our production and consumption systems. For example, a beetle from the Namibian desert knows how to pull water out of the air — and a scientist from Oxford University has developed a fabric that just does that. Similarly, a termite hill has taught us how to keep buildings cool without having to use energy. All this is documented. The recent report to the Club of Rome, *The Blue Economy*, lists 100 technologies that are all about creating efficiency, equity, and employment.

China and India have shared thousands of years of faiths and culture —from Buddha to Lao Tse to Confucius — which have respected the unity of all life and the balance among them. You might call it ecological civilization. Now, we need to re-learn from these traditions everything that we forgot during the past couple of hundred years.

The four principles of sustainability that we must singlemindedly focus upon are: equity, environment, economy, and empowerment. As Mahatma Gandhi said: there is enough for everyone’s need, but not enough for even one man’s greed.

The last of the open forum’s leading speeches was presented by **Lars-Erik Liljelund**, Chief Executive of Sweden’s Foundation for Strategic Environmental Research (MISTRA). He spoke about Sweden’s experience with eco-innovation. Here are some of the points he made:

Sweden is perhaps not well known as a place where green transformation got going, but in 1967 ours was the first country to start an agency for the environment. In Scandinavia we had a problem from neighbours, especially the United Kingdom, of cross-border sulfur and acidification. So Sweden and Norway got together to see how to handle the situation, and this was the starting point for our environmental work.

In Sweden we have intensive innovation and research activities. The system for

innovation is based on the “triple helix” model — cooperation among science, industry, and government.

Eco-innovation is based on a policy mix. We use legislation, regulation, standards, fiscal policy, information, and so on. This policy mix is the point of departure for market-based mechanisms like trading schemes, price mechanisms, taxation, subsidies, and so on. We have had good experience using market-based mechanisms.

Sweden, like China, is extremely dependent on exports. In fact, exports per capita are higher in Sweden than in China. Our big industries are forestry, steel, mines, and so on. Companies such as Ericsson and others mean we depend on exports, so we try to combine this situation with the pressure for innovation regarding the ecological situation. The result: environmental regulations, requirements, and standards are all important drivers for technology development and innovation.

One example is Sweden’s experience with NO_x charges. We introduced a charging system for NO_x whereby those who are affected get money back from the system, and those not affected are net payers.

Another example is the use of waste. Waste management has been driven by legislation. First we introduced a landfill tax, and then the legislation forbade putting burnable waste or organic materials in the landfill, which means that soon the landfills are not used any longer. Now we have waste combustion for energy production, combined with stringent regulations to control the emissions. Today, Stockholm, the capital of Sweden, is run only on waste.

In Sweden the new concept is “bio-based economy.” That is, our economy must be based on reusable biological resources coming from waste management. For example, you have to pay those who take care of your waste. In fact, now you can be paid to give waste to the collectors, because the value of the garbage is increasing.

What has been successful is technology procurement. It can be used as a problem-solving tool to achieve cost effectiveness and improved environmental performance, and to stimulate innovation. With technology procurement you have an innovation-oriented public sector to create demand for new solutions and to drive innovation transformation in society. And it is not restricting public procurement to existing solutions. It is very much a drive for development of new products and functionalities for the future.

Among such initiatives are examples from the foundation I work for, MISTRA. We have a research program looking for systemic change in the Swedish fashion industry, involving better uses of cotton. Another program invites the business sector to submit ideas for innovation, especially in the energy sector, after which we find the right scientists and provide financial support for the development of these ideas.

The open forum Co-Chairs next introduced speakers who delivered brief “leading comments.” The first of these was presented by **Li Xiaoxi**, Honorary President of the School of Economics and Resource Management at Beijing Normal University. He spoke about China’s green development index:

The index aims to promote green development in China, especially in the provinces and cities. We want to raise public awareness about resources and improve public participation in green development. Also the initiative responds to UN proposals on green economy, and cooperates with international platforms for green development communication. The *China Green Development Index Report* has been translated and issued by the international publishing house Springer.

The main ideas underpinning the index are these: we highlight the relationship between “green” and “development.” We emphasize that green is indispensable in the production process. We stress the responsibility of the government in promoting green development. And we strongly value the openness and authority of data sources.

The index makes use of a large number of specific, tiered indicators. The index has ranked China’s provinces and provincial-level cities, with Beijing and Shanghai leading the way in terms of green development. Among other cities, Shenzhen leads in green development.

The deepening of economic restructuring should go hand-in-hand with a green economy. This idea is based on China’s well-established concept of scientific development and the new notion of a Green New Deal. From a strategic point of view this idea is very influential, as it concerns relations between man and nature. This is our priority. Green economy is important not only to China but to the world. Our future reforms will be closely associated with green transformation, and they will help address the relations between government and resources.

The next comment came from **Lim Haw-Kuang**, Executive Chairman of Shell Companies in China:

As a businessman I would like to share a story about what Shell has been trying to do to become a strategic partner of China and also help advance green development in a small way. A few years ago, I was asked a simple question: how can Shell become a strategic partner with China? So I came up with four strategic priorities, all having some link with green development:

- We work with Chinese partners to develop energy projects overseas and bring cleaner energy in the form of liquefied natural gas back to China.
- China has huge unconventional gas resources. Unconventional gas at the end of the day is a clean form of natural gas. We are applying our North American technology and know-how, and working closely with our Chinese partner and being aggressive in developing the resources here.
- To apply technology with more energy efficiency, or to conduct business operations more efficiently, we must apply research and technology. This is what we have been doing in China. We are always looking for more innovative technology, trying to find ways to develop energy in a more efficient and environmentally friendly manner.
- As an overseas Chinese, I like to work with Chinese enterprises and help bring them overseas, so we identified a number of Chinese organizations in the oil and gas service industry, and took them overseas. What has this got to do with green, clean development? When we take them overseas, we expect them to go through the green supply chain and also to enhance their safety and environmental standards. When they go outside they build a platform to provide services, and at the same time show they are better environmental citizens.

Zhang Yuzhuo, General Manager of the Shenhua Group Corporation, spoke on the topic “Clean Energy: Golden Key to Strategic Transformation and Green Development.” Here are some of his points:

The key for China’s green development of energy is clean coal. My company is the largest coal company in the world. We are also an integrated energy company, supplying 12% of China’s primary energy, and 6% of coal for utilities.

We work on clean coal conversion, to convert coal into liquid fuel. One of our refineries can produce 25,000 barrels of oil per day from coal. We produce polypropylene and polyethylene from coal. We also deal with CO₂, and we were the first to inject CO₂ deep underground.

As for the use of clean energy in China, coal will be the primary energy source — but we can use coal cleanly. We can convert the coal through gasification and liquefaction, and we can produce thermal and electric power, liquid fuel, and chemical products. During that process we can clean up the pollutants as well as CO₂.

We should take two steps for the transformation of China's clean energy: we should use clean coal technologies, and we should promote the large-scale development of renewable energy sources.

For the next eight years we should reduce the use of coal. Today it is almost 70% of China's energy mix. I hope we can reduce that figure to 57% by 2020. Furthermore, by 2020 energy intensity can be reduced by 44% of the 2005 level. We can further reduce CO₂, SO₂, and NO_x from current levels. By 2050 we can further bring coal down to 43% of the mix, and the intensity can be further reduced by 78% of the 2005 level.

How can we do all that? Today, new forms of energy are very expensive, but coal is cheap. We can combine the clean coal with new and renewable energies in one energy system. And, we can deal with the CO₂ and we can produce multiple products. The target of clean energy is a strong driver for strategic transformation and green development, and for the harmonious development of energy, economy, society, and environment.

John Forgách, Chairman of the Board of ForestRE Holdings, spoke about his experiences in the forest industry:

We have had many frustrations in trying to promote green enterprises over the past 20 years, whether it's in biodiversity or clean technologies or renewables. We have tried all those things. We are deluding ourselves if we believe we are going to change the world and create an ecological civilization unless we address the issue of human resources.

If you want to create a green company, the most difficult thing is to find qualified executives to run the company. The business schools are not producing the right graduates. They are producing graduates who want to create the next hedge fund disaster. And the environmental schools are producing romantic biologists and zoologists and forestry engineers who are unable to do a discounted task flow, so they are useless in business.

As China moves toward its green and ecological civilization, and talks about “people first,” there are two dimensions China must consider: a) preparing the right human resources for success in this enterprise, and b) the search for an alignment of interests between the bottom-up and the top-down initiatives.

Business schools in China have to help prepare executives for this activity, whatever you may call it — going west, going green, creating an ecological civilization. These schools should address two issues that are currently lacking.

First, we need business cases. Business schools should start immediately finding ecological initiatives in order to create business cases that can be traced through their lifespan, through their implementation, so these cases can be corrected, altered, or compared. Currently there seem to be no green business cases in China. This means we have no parameters, no basis to measure performance. Whether it is in dairy products with Nestlé, or in green retailing with Walmart, or in renewable energy with the power companies, business schools must start working with companies so we know where we are and what we are doing.

Second, business schools should seek to create joint programs with environment departments. In other words, business schools should train business executives who have a heart, and environmental executives who have a head.

The other issue is the question of the alignment of interests. When an investor comes into a new country, it is not enough to have brilliant top-down ideas, policies, and suggestions. You need to seek alignments with the people who will be affected by your enterprise — the people at the bottom. It can be very difficult to find an alignment of interest with the people in the jungles of the Amazon or Papua New Guinea. Typically, no one asks their opinion about how to run the business. In my own business, I have learned that if I do not find an alignment of interest with the people who will be around my timber investments — 2000 kilometers distant from

my headquarters — they may decide to cause harm to my company's assets.

The important factor in protecting these assets is gender. Gender balance in investment, in the management of green business is vital. It is gender balance that keeps the equilibrium out in the field. If we educate and empower the women who live near our timber investments, they will form a family and create 15-year investment horizons which require schools, safety, and security — and that will help protect our assets.

The final speaker was **Trutnev Yury**, aide to the President of the Russian Federation and former Minister of Natural Resources, Russian Federation:

In the course of its rapid development Russia has fulfilled its targets under the Kyoto treaty. At the global level, however, it is not clear that everybody knows what we should do in the future.

China's development has aroused much interest in Russia. We have noted the great improvements, and in particular that environmental policy in China has progressed rapidly in recent years. One example is cross-boundary rivers between China and Russia. Our countries have put in place a mechanism for information exchange about cross-boundary rivers. This cooperation has been quite productive, for example, fish have come back to some rivers and the rivers now meet ecological standards. I extend appreciation to our Chinese friends.

I believe we should press ahead with such cooperation. Just now we heard about the situation of tigers in India. In Russia, tiger numbers in the wild have stabilized at 500 to 600. Russia has a natural reserve set aside for leopards and tigers, but I think this work should be shared. We should cooperate in protecting these animals. We hope that we can work with China to establish an ecological corridor through which we can exchange monitoring data. I hope that on this basis we can increase the population of Siberian leopards and tigers. Although these two animals perhaps are only a small part in the entire ecological system, but their plight is meaningful for the future of humanity.

General debate and comments

In introducing the general discussion, the Co-Chairs made the following remarks:

Where it still feels like squaring the circle is in energy, in the sense that without access to electricity, there will be no development — but then, electricity at any cost will hamper development.

In Germany, on a sunny day, 40% of electricity comes from solar. In Denmark 35% comes from wind. These are advanced, competitive economies, so it shows that a country can be competitive and at the same time to be willing to pay somewhat for a more sustainable economy.

During our discussion I would like us to touch on the question of how do we see the energy development in China in coming decades? Is it possible to move from coal-fired plants being the main source of electricity to cleaner technologies, and then find a bridge between this and a more renewable energy society? Can we square the circle? Are there business models that could work?

The Co-Chairs opened the discussion, and Council members made the following points:

Is progress enough? The answer is no. It is not enough for China or for the world simply to do better than we are doing now. We have to actually find a way to get in balance within the limits of the earth's resources. It is not enough to be lower carbon or to be more efficient, or to have cleaner fuels. We know the science and the arithmetic. There is only so much carbon we can put into the atmosphere between now and 2050 if we are going to keep the temperature from rising more than 2°C. These are absolute numbers. Somehow we have to confront that reality and not just talk about how we can improve. As we look at carbon capture and storage, or the role of gas, or renewables, it has to be with an eye toward what the numbers tell us, and not just toward making marginal improvements.

In China and in the wider world, we must confront the challenge of the assets that will have to be stranded, the tens of trillions of dollars worth of known reserves in coal and oil and gas that we simply cannot afford to burn if the climate is to stay within 2°C. How do we confront that question, which is of national significance for many countries and hugely significant for many companies?

An environmentalist once proposed advising China “not to use coal, period.” This is an environmentalist without a head, because China needs security of energy

supply. Coal consumes about 70% of China's primary energy needs. The 12th FYP and 13th FYP indicate that China has a clear roadmap toward cleaner energy with a lower-carbon economy, reducing the coal footprint and increasing cleaner energy in a meaningful, sustainable manner. It aims to do this while ensuring energy security, economic growth, political stability, and social harmony all at the same time. So let's not talk about one aspect and forget about all the other competing parameters, the harsh realities that all need to be managed at the same time.

Where is China heading in terms of "unconventional fuels"? In order to achieve energy security, you need diversification. You can't bet on one option. So, over time, cleaner energy in the form of renewables and cleaner natural gas will continue to gain prominence. China has huge unconventional gas resources, probably as much as the United States and Canada do combined. By unconventional we refer to tight gas, coal bed methane, and shale gas.

If you look at shale gas, China is still at an exploratory stage in terms of understanding the subsurface and applying advanced technologies. Also, China needs new policies and regulations to govern the development of unconventional sources, which are a completely different challenge operationally and environmentally. When you develop shale gas in China, there is a learning phase. Let us not rush into thinking this will be like the United States in five years' time. Much can be learned from the United States and Canada, including how to operate in an environmentally and socially acceptable manner. China's large population makes shale gas development difficult. So let us not have a romantic hope. But, would shale provide large amounts of cleaner energy to help meet China's requirement, and also help reduce the carbon footprint? The answer is yes, and so and let us work harder to make it happen.

If climate change is 4°C it will be a complete catastrophe, not just for the world but for China. It is not just an environmental issue; it is also a development issue. It will not be enough simply to be cleaner. The question is the total amount of carbon you put into the atmosphere. If we just fall into the trap of saying: ok, let us do as much as we can, then we will come up against limits that we have to take very seriously.

If we want to succeed in controlling climate change, we need to come up with a plan that is realistic, achievable, and believable, so that people will buy your story and implement it. We are talking about practical implementation, about compliance. But if on the other hand you try to impose something that people can not do, or will not do,

then we will fail.

Yes, we are talking here about “silver buckshot,” not a silver bullet. But businessmen with a head will understand the arithmetic and the science. They will understand that we will not be able to exploit every fossil fuel opportunity. Indeed if we develop every fuel resource currently on the books we would blow the 2°C limit in a big way. We need business people not to make big bets and plays that they will regret. For example, if we crack the carbon capture and storage with coal, it would be better to turn it into electricity and use that for transport purposes rather than as fuel to be readmitted into the atmosphere.

In developing alternative energies, China faces more difficulties than do developed countries. In those countries the energy requirements are pretty stable, which is why alternative energies can replace traditional ones. Their energy portfolio can change quickly. But China is at a lower level of industrialization and its economy is growing fast, so the consumption of energy is increasing. In China alternative energy at this point is low, even though China every year increases its alternative energies by 10%. Still, because of China’s size, every year both the investment and the growth in alternatives in China are the largest in the world.

Under these circumstances the need for coal continues to grow. The rate of growth will slow but the total will increase. This growth probably will extend beyond 2020, so China has to improve the efficiency and cleanliness of the coal it uses. It also must extend the capture and storage of carbon.

China needs an integrated, comprehensive set of policies and mechanisms: energy conservation, energy efficiency, and a lower rate of carbon emission. It must improve its energy structure, which will include nuclear energy. Many countries are turning their back on nuclear, but this will be an important part of China’s energy structure. China is developing its third-generation nuclear stations based on the latest safety criteria. Nuclear energy will gradually replace coal and thus will help us achieve a low-carbon economy.

The problem with coal is the GHG. Sometimes governments go into too much detail in regulating technology. Governments should be technologically neutral. It should be left to the business sector to find and develop the right technologies. That is, we should be able to use coal, but without the GHG. In most countries, the use of the resource is difficult to regulate, but you can always regulate the impact of its use.

China, because of its size, needs a more integrated, systematic approach in the development of its energy sector. It needs a more holistic approach, with more upstream-downstream thinking. The shift to renewables also can create a disaster depending on what type of energy you are using. For example, using biomass can create big problems. It is important to have a business model so that governments are clearer about the playing field.

Earlier we heard comments comparing people from business schools with environmental graduates. Note that many global business sectors, such as forestry and marine resources, have been trying to institutionalize their environmental consciousness by way of certification systems, stewardships, and so on. The only sector lacking this way of thinking is the financial sector. Seldom do you hear discussions about how the financial industry contributes to sustainability.

In fact, China is relatively advanced in terms of its green policies in the banking sector. This year the banking regulatory authority launched an aggressive green investing governance system. The problem is, once again, that we may have great policies and regulations, but in China none of the executives know how to implement them.

Item 8. Open Forum Briefings and Adoption of Recommendations

Briefings on the open forum discussions

CCICED Secretary General **Li Ganjie** introduced CCICED Vice Chairperson **Achim Steiner**, who briefed the conference on the discussion in Open Forum 1: Regional Coordination and Green Development. In addition to summarizing the exchanges that took place during the forum, he made these observations and raised these additional questions:

What is clear is that the challenges of achieving equity and sustainability have created an imperative that demands of leaders and practitioners in China not just an incremental approach, but a transformative approach. Transformation was a term frequently used during the forum.

Our Chinese colleagues who presented yesterday reminded us that this

discussion is not beginning from point zero. China has already put into place a number of instruments and planning frameworks and implementation processes, among them the strategy for protection of the regional environment, the national environmental functional zoning plan, and the urban environmental master plan.

On the need to address the green economy, green development, green cities, green growth, green infrastructure, and so on — where precisely is the delineation of this green concept? What is its focus in terms of people? How does it differentiate between the poor and those better off? We must remember that the success of green development is to be measured not only in terms of its ecological dimension but must also be rooted firmly in appreciation of its social dimension, particularly focusing on the poor.

The notion of integration is critical. In order to achieve transformation you cannot look only to individual sectors, individual enterprises, or individual development initiatives as being sufficient. The answer is to link these different areas of action.

Cities and urban areas are key points of integration, where the kind of transformation that the green development concept envisages is easier to realize. Speakers highlighted the capacity of citizens at the local level to be architects of specific solutions for their area.

How, in practical terms —tomorrow — do you begin to work on this? How do you set priorities on the basis of the aspirational and the visionary? The task every day of officials and citizens at local levels is to translate these visions into practical action.

Li Ganjie then introduced CCICED Deputy Secretary General **Xu Qinghua**, who briefed the conference on the discussion that took place during Open Forum 2: Strategic Transformation and Green Development. Aside from summarizing the discussion, he made these points:

The 12th FYP is a key period and the next 20 to 30 years will determine whether China will move from being a large economy to being a strong economy. The deepest structural problems have now come to the fore even more clearly. The development of the economy, poverty elimination, and guaranteeing people's livelihoods are becoming even more onerous tasks. China's development is still uneven. 128 million people are still very poor.

The whole world is trying to regain its balance after the economic crisis, and so is China. The forum believed that green development is the necessary choice to build an ecological civilization and a beautiful China. Green development provides a new engine both for economic growth and for industrial competitiveness.

Extensive growth must ease into intensive growth — from blind pursuit of economic growth toward equality and efficiency, from a copycat high-carbon path toward indigenous innovation and a low-carbon path.

Recommendations for submission to the State Council

With **Li Ganjie** presiding, Chief Advisors **Shen Guofang** and **Arthur Hanson**, and **Ren Yong**, Coordinator of the Chief Advisors' Support Team, briefed Council members on the revised 2012 CCICED recommendations. They emphasized the following points:

Our revisions to the draft recommendations have been made on the basis of the speeches by Vice Premier Li Keqiang and by Ministers Zhou and Kent, the remarks delivered by the CCICED Vice Chairpersons, and the comments and suggestions from CCICED members. The revisions have been carried out on the basis of this year's theme, Regionally Balanced and Green Development. We have aimed for a macro- and mid-level orientation toward the State Council level. We will prepare a concise ten-page version for the State Council but a more detailed version for relevant ministries.

In the document's introductory paragraphs we have added this sentence — “Effective coordination and cooperation mechanisms for integrated ecological system management, air and watershed pollution control are missing among regions, provinces and cities.” — as well as some content related to poverty and ecological deterioration.

In line with the speech by Vice Premier Li Keqiang, we propose the following revisions to Recommendation 1, Item 2:

- At the central level we should launch a Commission for Ecological Civilization, to ensure that ecological civilization is fully integrated into China's political, economic, cultural, and social development.

- Environmental protection agencies should play the role of leader, driver, and practitioner in the development of ecological civilization. Furthermore, there should be a new integrated ministry with a large portfolio in charge of ecological management.
- The relations between central and local governments should be well coordinated in terms of the development of ecological civilization. Their respective roles, responsibilities, and authorities — especially in financial terms — should be clearly delineated.

We propose adding under Recommendation 1 a new Item 4, to create an indicator system to help engage the public. We should develop objectives and targets and methods that take account of the differences among the regions, as well as evaluation measures for decision-makers at different levels and in different regions. The roles and responsibilities of government, business, and the public should be clearly defined.

Under Recommendation 3, Item 1, regarding mobile pollution sources and vehicle pollution prevention and control we have added quite a bit of content. In the meantime we also included an additional item about enhancing efforts in multi-pollutant control.

Regarding Recommendation 5 — which concerns the task force on the 12th FYP — some Council members pointed out that the recommendations in this section are not the same as what you find in the task force report itself. We checked and found that the English and Chinese versions of the task force report have different structures, but the content and conclusions are the same. We suggest that these recommendations should respect the task force reports. Therefore, for the Chinese version of the recommendations we adopt the suggestions in the Chinese version of the task force report, and for the English version we use the English version of the report. This will not have an impact on the substance of the conclusion or on the use of this information by decision-makers. In fact the task force made an interim report to the AGM last year, so some of their suggestions were already adopted in last year's policy recommendations.

We should flag one issue for general discussion, specifically the detail under Recommendation 1 about reform and establishing new government institutions — namely an environment commission and a “super ministry” — capable of creating and supporting an ecological civilization. The idea of a commission is very much in line

with the Chinese way of bringing together high-level people, crossing boundaries, and so on. But does CCICED feel comfortable about offering specific recommendations about the structure of the Chinese government?

Comments and discussion on the revised recommendations

The way the proposal about the “super ministry” is expressed does not cause concern. It would have been worrying, however, if it proposed picking up responsibilities for agriculture, energy, forestry, and so on, because you would have run the risk of losing the purpose of ecological civilization. The fact that it is a consolidation of environmental issues and responsibilities is an important defining purpose. Perhaps it would help to add one sentence: “This super ministry should support and not detract from the other ministries’ responsibilities for ecological civilization in all their work.” So it is not setting up a competitive enterprise. It is setting up a coordinating, facilitating, and supporting exercise, and it doesn’t exempt anyone else from their responsibilities.

Also the “ecological civilization commission” is not clearly explained. This commission is similar to the body we have now, the Central Guidance Commission for Building Spiritual Civilization of the Communist Party of China, which is an organization where we have discussions on important issues. Its job is to coordinate different ministries in order to facilitate work in this area. It doesn’t mean that MEP will be expanded or replaced.

Each year for the past five years we have included this kind of suggestion in our policy recommendations. The thinking behind it is that the environment is a system that needs to be looked at in an integrated and holistic way. If we divide up that system administratively, it will be difficult to manage the whole thing. An obvious example is water systems, and last year at our AGM we proposed setting up an organization that would deal with water from its source to the ocean. In China’s current institutional setup, much of the organization and distribution of tasks is not totally rational, and we need some kind of institutional innovation and reorganization.

A commission for ecological civilization is a good idea. The concept of a “whole of government” focus on achieving ecological civilization and ecological progress should be supported, since every ministry has the responsibility to work in a coordinated fashion to achieve that end. But the wording of the recommendation is somewhat too firm. We should be hesitant to encroach on a sovereign government’s structure of government responsibility. The wording could be changed from “a super

ministry should be established” to perhaps “a super ministry may be established” or “the government of China may wish to consider the creation of a super ministry to achieve these very valuable and worthy ends.”

Obviously a body like CCICED can propose areas for substantive improvement, but the actual “wiring” of institutions is something governments must do themselves according to their particular circumstances. But there does need to be, at the highest level, the capacity to assemble representatives from various ministries to ensure that they are all interpreting a concept like ecological civilization in the same way. The concept needs to be shared and integrated. A commission is an excellent way of pulling together and assembling the key agents to ensure that they are treating the concept consistently.

The idea for a “super ministry” is surprising to see. Perhaps what is being called for is actually to boost the capacity of MEP to provide the coordinating capacity that is required. Every ministry coordinates with others. For example, finance ministries have the capacity to coordinate financial and fiscal matters across all of government. The environment ministry has to have this same capacity. But that doesn’t make it a “super ministry.” The real point is that everyone is working toward the same concept and understanding it in the same way.

In many respects these recommendations raise more questions than provide answers. We should look back at the work of the environmental governance task force from some years ago, because this topic was addressed in that context. It recognized the importance of having a high-level advisory body directly connected to, and reporting to, the premier. The question was: was that sufficiently robust and did it have sufficient power and remit to provide this capacity. The task force looked at different examples of environmental governance work: the Council on Environmental Quality in the United States, for example, and Germany has a high-level commission that advises the government directly. Some countries use a nominated individual who ensures that ecological issues get addressed. So there are a number of different strategies.

In Recommendation 1, Item 2, the very important words “coordination mechanism” are absolutely essential. This is the key, because these functions will flow throughout various ministries.

Regarding the “super ministry,” how is it to be established? By transferring functions and individuals from existing agencies? Or through a consolidation which

might be challenging just on a personnel basis, since people will bring differing philosophies, mandates, working styles? The devil is in the details.

We have been talking about coordination mostly at the national level, but the relationship between the central government and local governments is crucial when we think about implementation. We know there is a great degree of flexibility and independence in terms of implementation at provincial and local levels. So, finding a way to establish a more direct line of responsibility and accountability beyond what has been done in relation to individual employee's performance evaluations is needed.

In the Chinese version of the recommendations, where it speaks about air quality and public health, three different terms have been used: to *guarantee* public health, to *ensure* public health, and to *protect* public health. We need to think about consolidating and using the same terms so that this relationship between the environment and public health can be properly defined.

A commission is necessary given the newness of the concept of ecological civilization: how to think about it, operationalize it, interpret it? But it will take time to do that. Is it necessary at this point to think about the operationalization of these ideas, in terms of the mechanism? Could we not just have the commission set up, look at how it would function, what are some of the elements of ecological civilization, then look at what are the options. In the Canadian government we effectively use cabinet committees at the political level, but at the same time in the bureaucracy, at the public service level, we have many committee structures created just for the purpose of coordination. So there are different ways of coordinating operations. Perhaps we should park that decision for the future until we get a handle on how the commission can operate.

The phrase about the “the east leads but the west is the focus” may sound elegant, but when we consider green development, Eastern China may not necessarily be the model for how you want to think about the rest of the country. Perhaps this language should be modified.

The new ideas about environmental protection that have been proposed by the 18th Party Congress should be more entrenched by being elevated to the level of a law that would have to be approved by the National People's Congress.

Regarding Recommendation 5, we should strongly support the addition of

human health protection. Officials our task force has met with at both national and regional government levels in the environment area all spoke of difficulty in getting timely indicators from the environmental and ecological sphere in order to obtain an indication of risk. Health indicators should be given high prominence, because international experience suggests that they often provide a timely if not real-time indicator to guide risk assessment and the need for action on a national or regional basis.

Council members adopted the recommendations by acclamation.

Item 9. Closing Session

Secretary General's report and 2013 work plan

CCICED Vice Chairperson **Achim Steiner** introduced Secretary General **Li Ganjie** who presented to Council his report and CCICED's 2013 work plan. Secretary General Li underlined the following issues during his speech:

I would like to briefly review what we accomplished during 2012, the first year of Phase V.

First, we successfully ran a side event at the United Nations Conference on Sustainable Development, Rio+20. Premier Wen attended, and he had warm and frank dialogues with the participants of the meeting on the topic of sustainable development. This fully demonstrated the importance that the Chinese government and the premier himself attach to CCICED and is an example of the support he has delivered to this organization. It also highlighted the importance of the Council as a high-level platform for dialogue and exchange. The premier commended efforts by CCICED, and said that the Council is vibrant because it has an "eternal theme" which is sustainable development. The Council's importance as a platform is reflected particularly in the cooperation between China and other countries, and in its influence on global environmental work. So we will continue to run CCICED and it will become better and better.

Second, we achieved the transition from Phase IV to Phase V. We completed the nomination of new members and the revision of the charter and supplementary

provisions. We identified the key areas of research. We received a lot of support from funding partners. The Chinese government doubled its funding support to CCICED on the basis of Phase IV. All the main donors increased their support. So far we have secured about US\$ 24 million, an increase of one-third compared with Phase IV. This has provided a lot of assurance for the operation of the new phase.

Third, we have achieved the expected results in policy research. On the topic of regionally balanced and green development, Chinese and international experts did great research work, laying the foundation for this successful AGM. We also held a strategic salon where we invited experts from economic, social, and environmental backgrounds to have open discussions. This has injected new vitality into the Council's research.

Fourth, the policy recommendations have been given a lot of attention by the senior leadership and by ministries. Some of these recommendations are already reflected in the policies being implemented. For example, in 2011 in our recommendations we proposed that a pro-green transformation evaluation system should be developed for decision-makers. In Aug 2012, the State Council issued the 12th FYP for energy conservation and emissions reduction. It provides that the State Council will evaluate the performance of provincial governments on their emissions reduction and energy conservation targets. The result of this evaluation will be incorporated into the overall review of these leaders, and a performance-based accountability system will be instituted.

Another example is that in 2011 the Council proposed a low-carbon industrialization development plan including carbon intensity reduction targets for heavy industry and the chemical industry. In August 2012 the State Council issued the 12th FYP for energy conservation and emissions reduction that set targets for energy conservation for industries. We also proposed to develop China's green supply chain system, leveraging green consumption and the green market to improve the green transformation production system. We also proposed to enhance emissions reduction in mercury-related industries. In the 12th FYP for strategic and emerging industries and in the 12th FYP for the nonferrous metal industries, all this has been reflected.

The Chief Advisors and their support team have written a report on the major policy progress in environment and development in China and the impact of CCICED policy recommendations. This report has been made available to you.

Fifth, the Chinese government has further enhanced its leadership and support to CCICED. The capacity of the Secretariat has improved and its operation has become more efficient and effective. The Secretariat and SISO as well as the Chief Advisors and their expert support team work together to ensure the proper operation of all activities. I am grateful to all Council members and experts for their contributions during the past year, and I particularly thank donors and partners for their assistance to CCICED.

Now, here is the report on the CCICED work plan for 2013:

First, policy research. This has been the core task of CCICED, in order to lay a solid foundation for the policy recommendations. During this new phase we will base ourselves on the 12th FYP period and look ahead to the 13th FYP. We will align with the vision of China being a moderately prosperous society by 2020, and also with the new vision of building an ecological civilization and a beautiful China.

In 2013 we will conduct research on environmental protection and social development so as to integrate the development of ecological civilization into all aspects of social development. We will continue and finish the task forces that were launched in 2011, one on environmental protection and social development, and the other on sustainable consumption and sustainable development. Meanwhile we will have three special policy study projects, promoting green development and public participation in public policy-making, corporate social responsibility in green development, and promoting urban green commuting. We will also establish pilots in Tianjin and Shanghai on the subject of green supply chain. These pilots will help make the recommendations of the Council more practical and executable. In total there will be six projects and all these will make presentations to CCICED in 2013.

We will also launch policy research projects which will be completed and presented to the AGM in 2014. For 2014 the research focus is management and institutional innovation of green development. One task force has already been decided, the evaluation prospects of green transformation. We will also look at the mechanism of institutions of sustainable development and at the effect of China's overseas activities on global sustainability. In our research we will also consider the 18th Party Congress and the first session of the 12th National People's Congress which will be held early in 2013. We will consider the key research areas identified by these two major events.

Second, we will run the 2013 roundtable. We will invite officials from the central and local governments and experts from home and abroad. At this event we will share recommendations made by CCICED in 2012 with the participants so as to expand the scope of influence of the Council. In addition we will have discussions on the environment, society, and green development in relation to the theme of the AGM 2013, and so help lay the foundation for that AGM.

Third, we will organize and run that AGM. It will be held 13-15 November in Beijing. The theme is Environment and Society for Green Development.

Fourth, we want to cement partnerships and expand the scope of cooperation. We want to increase publicity about what we do and expand our influence. We also want to increase exchanges and interactions between CCICED and its members, donors, and partners. We will also carry out capacity building to improve the Council's level of operations and management. We will also explore creating mechanisms for the long-term management and stable development of CCICED.

2013 will be a new starting point for China, a new era, a new time — and we are given new tasks. There will also be new challenges. We are convinced that with the concerted efforts of the members during the new phase, and with the support and assistance from donors and partners, CCICED will continue to play its important role in the sustainability cause in China and the world. We will live up to the expectations of Premier Wen. We will be here for a long time, and we will be better and better.

Comments and discussion on the work plan

Over the past 20 years CCICED has made a huge contribution to the theory and practice of development, but the time has come to recognize that generally accepted models of development have not always worked and are no longer considered viable. Now in the new phase the Council needs to spend more time and effort on “green and inclusive” development. Regional, rural-urban, and rich-poor divides need to be addressed in an aggressive way. People aren't going to accept any longer being excluded. Large numbers reject the notion they are second-class citizens. They may even take to the streets and do violent things. It is important that the Council address not just big issues, big industries, big sectoral growth, but also the necessity of bringing everyone onto the process in a clear and well-defined way.

Engaging with China's activities overseas is a new frontier for CCICED. There is huge potential for the Council to make important contributions to looking at how the idea of ecological civilization comes to life in China's involvement in other countries. The task force or study that is planned should tackle China's official cooperation with other countries, that is, development assistance and bilateral investment. It should also look at the role of the finance sector. The guidelines issued by China's banking regulatory commission last February are an impressive start in bringing sustainability into lending practices, and it will be important for CCICED to examine how those guidelines can be brought to life in the context of investment in Africa, Asia, and Latin America. And it can also look at how Chinese companies are operating overseas, and how global norms can apply to those activities both in terms of compliance with local laws but also in stepping up to meet a higher standard of sustainability, for example, for timber or mining operations.

At the same time, the China Council should make it a priority in coming years to look into establishing new kinds of working partnerships, whether with governments, companies, or perhaps with regional institutions such as the Asian Development Bank.

In the wake of the financial crisis, this is difficult period for the planet. The eyes of the world are on China. China has taken an extraordinary position in the global economy. Its appetite for commodities and its capacity to invest abroad mean that it is projected constantly in the minds of everybody outside of China. China needs to maintain a common standard as it develops its ecological civilization, domestically as it moves westward, and to do the same for its offshore operations. If China does not apply the exact same standard of development abroad as it does at home, it will lose credibility, it will lose its license to operate, and it will aggravate its very delicate image today in the world. So the Council has an important role here, which is to study how China can adopt exactly the same standards of sustainable development offshore as it does at home.

We also need to discuss how to manage and organize the institutional structures that will implement these big concepts and long-term visionary agendas. A European study asked: if we wish to achieve transformative change focusing on sustainable development, are our research structure and capacity sufficient to achieve this goal? In Germany and in Europe more broadly, the conclusion was no. The study found that the investment in research is still dependent on the past: we don't invest in the issues that are important now. Interdisciplinarity among natural scientists, social scientists,

and engineers is weak, as is communication of the results of science and research to the wider society and to political leaders. The translation of scientific results into educational programs is not well in place. So in CCICED we should focus on these mechanisms during the next few years.

We do need to talk about inclusive green development, in line with the outcome of Rio+20. As we move toward this inclusive low-carbon economy, at the same time we can make poverty history, in China and in the rest of the world — if we take a scientific approach. The contribution of China to world development and moving the whole planet toward a new sustainable future, including defining sustainable development goals, could be a great contribution in which we in CCICED would like to play a role.

A great deal of China's economy is based on its coastal environment and offshore activities. But these ecosystems are in a bad state in some parts of China. We are land animals and we tend to forget what is going on under the surface of the sea, but we have indications that the status of some of China's coastal seas is in fact worse than anywhere else in the world. We have to approach these problems and deal with them. Why not set the goal of restoration of the Bohai Sea? Make a blueprint or plan for restoration of this area. It is possible. It has been done. The countries around the Baltic Sea 30 years ago agreed to clean up that body of water. The situation in the Bohai is worse than it was in the Baltic, but the Bohai Sea is more open to the ocean, so it should be possible to restore this area in a shorter time.

For the Council's new task force on sustainable consumption, the challenges are evident. China will have the world's largest consumer class. This has an impact domestically, of course, but also internationally because China's consumption patterns will influence the whole planet. We see large corporations already putting their designs in place to serve the Chinese market, and this is also affecting the global market. We are challenged now to build an infrastructure which will influence lifestyles and consumption patterns for some time. We look forward in the task force to discussing a road map to the year 2050 to bring in social innovation and civil society action that will foster a more sustainable consumption pattern. No country on earth has yet done this.

Closing remarks

CCICED Vice Chairperson **Achim Steiner** offered a general summary which included these comments:

Many people appreciate the work of CCICED because its value as a forum and its relevance extend well beyond China. Often in the past the Council maintained a strict focus on China's development choices and path. Its value in generating new ideas in development, in transitioning toward green development, a green economy, green growth, and so on, mean that this forum has relevance well beyond China. This is a tremendous tribute to those who matured and shaped the China Council over the years.

This year at the Rio+20 meeting we were fortunate to have the presence of Minister Zhou and Premier Wen. The first-ever CCICED side event held during the summit was a tremendous success. It indicated that the value of the Council's work deserves to be heard, understood, and appreciated well beyond the traditional forums in which we have operated.

The emergence of a discourse about the future of China's development — particularly the concept of ecological civilization — echoes how the wider world now is discussing development. The sustainable development goals issuing from the Rio+20 summit and the framework to articulate these goals will both be of relevance to the discussion within China. But perhaps also the thinking and practice within China that emerged out of the 18th Party Congress could feed into the global sustainable development goals. We are a community of seven billion people who have to live on the planet together. The frameworks that will shape the evolution of our economies will increasingly reflect the discussion that China has already launched. At the end of the day ecological civilization cannot be achieved only by environmental protection, but the notion must transcend into every area of the institutional, political, and economic landscape.

Achim Steiner then invited CCICED International Executive Vice Chairperson **Peter Kent** to make closing remarks. Following are the highlights:

We have reached the conclusion of a successful and important AGM. I would like to thank Minister Zhou for his assistance and cooperation in this meeting, and for his many years of support for CCICED. Also I recognize the central role that Secretary General Li plays in Council work, and we are grateful for the contribution of the Secretariat and the Chief Advisors. Their commitment and dedication and the high quality of their work are evident not only in the arrangements for and substantive

contributions to this year's meeting, but also in the support they bring to the Council's activities throughout the year, every year.

That CCICED has been able to keep pace with rapid change within China and globally in ever more challenging areas of policy relating to the sustainable environment is testimony to the quality of the partnership that the Council truly embodies. Inevitably there is debate, among and within our various countries, on how best to balance economic growth, environmental protection, and social development.

But whatever course we take, we are probably agreed on two points: 1) how China's environment is managed and how the environment interacts with development matters not only to China but to all of us; 2) in working together in support of China's continuing and impressive efforts to address issues related to environment and development, we learn lessons that can be applied in our home countries and abroad.

Thus, international cooperation is of mutual benefit. It serves all of us and it serves the international community. International cooperation is based on trust, respect, and partnership — all of which of course are the foundation of CCICED. The many governments and organizations that provide support for the Council — support that I salute — the hundreds of Chinese or international experts who have served on the Council or engaged in policy research over the years, all are evidence of the strength and durability of this partnership.

The reports we heard yesterday and the recommendations we discussed this morning underline our common interest. The recommendations are substantive and are of a very high quality. We hope that the final version will be helpful to the State Council.

I was struck these past few days not only by the concept of ecological civilization, or ecological progress, but also by the very rich exchange of different views related to its meaning and how it may be effectively implemented. I heard that ecological civilization is key to ensuring a sustainable future for our planet. I heard that China's commitment to this concept demonstrates the desire for creating a nation that cares not only for the improved well-being of its own citizens but also that of all humanity. I heard that this goes beyond being simply a question of economic and environmental indicators — it is about a way of life. I also heard that with China's increasingly important role in the world, and as it moves along this path, joint

international learning must take place. What these different views have in common is the importance of making harmony between nature and society a reality. The words of Vice Premier Li also made a profound impression on me. He talked about the fact that we have created wealth out of industrialization, but we have also created environmental costs. We have only one planet, and growth cannot be unlimited or unrestricted.

And for China it is a major challenge, because there is no precedent for a country of 1.3 billion to modernize. And as the Vice Premier also reminded us, we cannot leave our environmental problems for future generations.

Our work ahead in 2013 as we focus on the relationship between environment and social development, and during the balance of Phase V as we seek to help make green development and ecological progress a reality. It will indeed be challenging, but we agree it is a task we accept with enthusiasm, in the knowledge that the challenges – while they will be many – are to make progress on issues of fundamental global importance. I am honoured to be part of this common effort.

Achim Steiner invited CCICED Executive Vice Chairperson **Zhou Shengxian** to make closing remarks:

In Phase IV we did a lot of work. Those were an extremely constructive and fruitful five years. I'm sure that the next five years will be full of hope. I have three observations:

1) Each time we meet, I learn a great deal and I am also very stimulated and inspired. Our Executive Vice Chairmen, our Council members, the experts, and the staff have worked very hard and are extremely committed to our cause, and this has impressed me greatly.

2) Each time we meet, it is a huge driving force that gives a great boost to the protection of the environment in China. As the Minister of Environmental Protection, my greatest challenge and test is how to use and make the most of all the ideas and proposals that are given at this council. These results are almost like wonderful weapons, or tools, that we have in our hands. The question is how are we going to use these, how are we going to put them into practice, not only at the national level but at the level of our ministry.

3) Each time we meet, we make proposals to the Chinese government, and I can tell you that the Premier always comments on these recommendations and delegates them to various ministries for serious consideration. There is always high-level follow-up and steps taken. For example, when MEP changed from a council to a ministry, and when China began using market forces to promote pollution mitigation, these changes were promoted and driven by the results of CCICED research.

We have also arrived at a number of common understandings. General Secretary Xi Jinping said in one of his statements, which impressed me greatly: “China needs to learn about the world, and the world needs to learn about China.” The 18th Party Congress drew up a number of important decisions for China’s future. The proposal for building an ecological civilization has been very much accepted and supported by Council members. I am happy to see the many positive reactions and suggestions that have been proposed. I believe we have a consensus on four points:

1) Our work in the future will revolve around how to modernize and set up an ecological civilization. We will plan and put this into practice. This will be our main direction.

2) This concept of an ecological civilization proposed by China is an important contribution to global development and environmental work. But the concept is not just an isolated idea. It is rooted in the ideas that came out of the global conferences on environment and development, starting with 1972 in Stockholm and running up to Rio+20 in 2012. The concept comes from the wider world, from everything that has been done up to now.

Although the 1972 Stockholm Declaration was inspired in part by a quotation from Chairman Mao Zedong, in China at the time the prevalence of leftist thinking meant that a lot of these measures were not put into practice. By 1992, and 2002, and 2012 of course the situation in China was very different. Each of these conferences has given a boost to the protection of the environment in China. We are very grateful for the world’s past experience for helping us in this regard.

The green economy concept was first proposed by Achim Steiner, and he has encouraged us greatly. Today the concept of green development has been accepted worldwide thanks to the contributions of United Nations Environment Program. This green trend is totally unblockable, so whoever has a faster and earlier understanding

of it will be able to progress faster and take an active role. Whoever is late will be much more passive and will find themselves lagging.

3) We need stricter environmental admittance standards to promote coordinated regional green development. What do I mean by this? We need to raise the threshold of environmental admittance criteria so that we can push this green transformation. This will be difficult in certain respects. You can say it's like a revolution — it is not going to be clean sailing. There will be all kinds of resistance. When we are promoting green development, every day we have to be prepared to overcome all kinds of dissonance and interference and uncoordinated actions. So the task will be very hard.

4) China is at a preliminary stage in its socialist growth and it is the largest developing country. At this point it is important to sustain the concept of “developing and protecting at the same time, and protecting and developing at the same time.” This is a new path which means we will have to turn our backs on the traditional path. Environmental protection has to become integrated with economic development. If we just talk about the environment without considering economic development, it is like looking for fish in a tree. But if we only talk about economic development without considering the environment, we are essentially draining the pond to catch fish.

CCICED has passed through 20 years of eventful growth and has been a witness to China's progress. I firmly believe this present phase of the Council will continue to contribute its new thinking, new actions, and recommendations for the benefit of China's environment and development.

Finally, **Achim Steiner** made some closing observations:

Thank you, Minister Zhou. All of us in CCICED feel that you have guided this Council with extraordinary clarity and political instinct. Throughout the six years since you and I were thrown into our respective appointments, I have been a student of your ability to master the art of when to put the foot down on the pedal, and when to take it back — to sense the opportunity. You have presided over an extraordinary period in China's articulation and maturing of its own understanding and development in the 21st century.

You have seen the graduation of a state environment protection agency into a

Ministry of Environmental Protection. In terms of your ability to relate to a global audience, but also to speak on behalf of China's reality today, you have been an extraordinary force in CCICED. I think the Council hopes it has been a good companion to you.

The rest of us are, at the end of the day, only contributors of ideas. But I often think that when you wake up in the morning and you must think about ensuring clean air and access to clean water for one in five citizens on this planet. It is an extraordinary responsibility. In terms of the CCICED contribution to meeting this responsibility, you have been a master at making use of it. I want to thank you on behalf of all of us for your leadership, because without leadership a forum like this would not function.

With thanks and congratulations to all participants, Vice Chairperson Steiner declared the First Meeting of the Fifth Phase of CCICED adjourned.

III. Recommendations to the Chinese Government

China Council for International Cooperation on Environment and Development

Policy Recommendations from 2012 AGM

The first Annual General Meeting of CCICED Phase V was held in Beijing during December 12-14, 2012, with the theme of *Regionally Balanced and Green Development*.

The CCICED members observed that the 18th CPC Congress Meeting provided a clear roadmap towards green prosperity and a ‘Beautiful China’. At the 18th CPC Congress Meeting, it was accepted that the Government of China put Scientific Development strategy as a highest guiding principle for the modernization of China, and listed Ecological Civilization, economic, political, social development and cultural construction as the five components of modernization. The government aims at major progress in resource saving and in constructing an environmental-friendly society by 2020 when an overall well-off society target is to be achieved. CCICED welcomes this coherent approach, which promises a more rapid and substantive shift towards a new era in the relationship between people and the environment.

CCICED members believe that balanced and green development is essential for China’s scientific development and for construction of an ecological civilization. Members believe that China’s green transformation is currently at a critical stage. There remain unprecedented challenges and pressures for achieving the objectives of green development. There are still prominent problems of “unbalanced, uncoordinated and unsustainable” development, with intensifying resource and environmental constraints. These issues are reflected sectorally, regionally, and even within regions.

Although China has made great efforts in the past decade to promote regional development and has achieved impressive progress, some problems and conflicts continue to intensify: large regional development gaps, especially in providing basic public services; imbalances of regional environment and economic benefit distribution, and a lack of coordination among policies related to population, economy, resources and environment. Effective coordination and cooperation mechanisms for integrated ecological system management, air and water shed pollution control are missing among regions, provinces and cities. And there is evidence of new types of

environmental issues emerging, such as those related to PM_{2.5}, and concerns about potentially unsustainable patterns of domestic consumption especially in richer parts of the country.

CCICED members have stressed the importance of addressing poverty alleviation while preserving fragile ecosystems, as a significant proportion of poor people live in these areas. There is a reliance on an extensive development mode in ecologically-fragile and lesser-developed regions, leading to potential conflicts between future environmental and development trends.

The members have concluded that, with further economic development, upgrading of industries and technologies as well as enhanced environmental protection efforts, the conflicts and constraints between resource use, economic development, and environmental protection could lessen. However, impacts from a “catching up” and “leap-frog” development mode in central and western regions with fragile ecological environments, together with a gradual transfer of polluting industries and other factors, may make the environment and development relationship more difficult.

Overall, the double pressure of environmental pollution and ecological degradation may threaten the foundation of green development in China. A key constraint is the institutional and policy-enabling environment, which today is a bottleneck for achieving balanced, and sustainable regional development. This is a key issue that the new central government must resolve.

Based on the discussions during AGM and findings of relevant studies, CCICED proposes the following five major policy recommendations to the Government of China:

RECOMMENDATION 1. Enhance institutional and policy innovation as well as enforcement in order to promote practical implementation of ecological civilization.

China’s government has recognized and committed to deepen reforms in key sectors, eliminate ideological constraints and institutional/policy flaws for scientific development, and clearly has set out some of the tasks of institutional innovation for creating an ecological civilization. It is necessary to speed up the establishment of strategies, policies, institutions and mechanisms that are compatible with an ecological civilization, and to conduct comprehensive pilot demonstrations for

practical implementation. Our four detailed recommendations are to:

(6) Define and develop mid- and long-term plans for an ecological civilization at the macro level.

Based on the reform and opening-up policies of the past 30 years and the practice of scientific development in the recent decade, there should be little doubt that China can and will achieve the target of developing an overall moderately well-off society by 2020, with significant progress in resource efficiency and environmental protection. However, according to China's target to become a wealthy, democratic, civilized, harmonious and modernized country by the mid of this century, the next 30 years beyond 2020 is of particular importance. Therefore, China's government should prepare for the future by initiating study of environment and development trends and characteristics beyond 2020, and systematically designing a mid- and long-term plan identifying priority sectors and key tasks ahead. China needs long-term targets to guide near-term policies.

(7) Reform and establish institutional systems capable of creating and supporting an ecological civilization with great political commitment and drawing upon the views of the Chinese people.

Ecological civilization construction and green development are new tasks. Reform is also a complex system issue that involves various government agencies, social sectors and regions, and requires coordination of interests of various stakeholders. Ecological civilization construction must not only focus on ecosystem and environmental protection, but also put forward ecologically friendly development principles for other social sectors. Therefore:

First, a Commission for Ecological Civilization to oversee the strategy, planning and institutional setup at the top level as well as to coordinate implementation details, should be established at the central level. The Commission should ensure that ecological civilization is indeed incorporated into economic, political, cultural and social development.

Secondly, environmental protection should be the underpinning for an ecological civilization, and environmental authorities should be the leader, supporter and key practitioner in a national ecological civilization coordination mechanism. Establishment of an integrated and comprehensive environmental authority for ecological and environmental protection with integrated functions and high efficiency

could be considered.

Thirdly, the relationship between central and local government should be coordinated in terms of ecological civilization construction within the framework of overall social and economic development, with authorities, administrative responsibilities and financial accountabilities clearly defined.

(8) Promote integrated institutional innovation towards the direction of green and ecological transformation.

To ensure that the concept of ecological civilization is incorporated into various aspects—and the whole process—of economic, political, cultural and social development, integrated institutional and policy innovation at various levels and within sectors is required, with greater attention to the levels of risk present in various development initiatives. The specific directions of ecological transformation of institutions and policies are:

- Politically, establish ecological civilization-oriented government performance assessments and other evaluation and accountability systems as a lever to ensure proper motivation and governance structure.
- Economically, put forward requirements on economic spatial layouts and structures. Require resource/energy efficiency and environmental performance in line with ecological and environmental principles to promote the transformation of production modes.
- Culturally, promote values and norms supporting ecological civilization and enhance awareness and action on the part of the public.
- Socially, advocate for green consumption patterns and direct social activities and promote a change of life styles compatible with an ecological civilization.
- Ecologically, put ecosystem and environmental protection as the main body of ecological civilization construction with provision of sound eco-services and products, and improve protection of biodiversity through greater attention to conservation and management of natural habitats on land, in fresh waters, and in marine areas and sensitive coastal habitats.

(9) Establish ecological civilization indicators, and encourage wider public

participation

Ecological civilization development targets, indicators and approaches should be established, taking into account the differences between main function zones and regions. In addition, a government official examination and evaluation system supported by appropriate indicators should be established and an accountability system should be implemented, taking into account differences between regions and levels.

It is also important to clearly define the respective roles and responsibilities of government, enterprises and civil societies in ecological civilization. Government should play a leading role in designing, guiding and exemplifying ecological civilization. Enterprises should assume higher levels of environmental and social responsibilities and improve their environmental performance. It is also important to strengthen ecological civilization related information disclosure, promote effective and orderly public and media participation, and achieve a collective force in ecological civilization.

(10) Promote comprehensive pilot demonstrations of ecological civilization

Given the complexity and difficulty of ecological civilization construction and the regional differences, it is necessary to carry out comprehensive pilot demonstrations of elements of ecological civilization to form an overall framework for a national promotion of ecological civilization construction. Ecological civilization pilot projects should take into account regional differences.

Large numbers of pilot activities have been conducted at provincial, municipal, county, village and industrial park levels by various sectors and departments in China. It is necessary to draw on and consolidate these pilot activities, and to develop uniform standards and a specific indicator system supporting the construction of an ecological civilization.

RECOMMENDATION 2. Establish a balanced and green regional development strategy.

Balanced regional development is a difficult topic for all countries. Closing the socio-economic development gaps is one key side of the challenge, while securing sustainable development is the other. China should grasp the historical opportunities of scientific development and ecological civilization construction to meet these challenges mainly through implementation of green development.

Our detailed recommendations are to:

(1) Establish general national principles and strategy for regional development to form a broader framework of regional green development.

3) From the perspectives of its industrialization stage, urbanization level, economic capacity, and public demand for a better environment, eastern China has the basic conditions to be the first region to achieve a green transformation. In the central and western regions, conflicts between environmental and socio-economic development are still likely to be present for some time to come. Therefore, these regions must be treated as a priority for enhanced support, but in differentiated ways, in order to avoid continuation of the old path of economic development at the cost of a fragile environment. Furthermore, the effort should lead to new approaches of national, and, ultimately, international significance for sustainable development.

4) To improve the speed and quality of such a transformation, develop and implement a green strategy or blueprint for the western region, covering infrastructure construction, human capital investment, urbanization, industrialization, pollution control and eco-services provision. Increase investment for projects that can improve the human capital in western region, enhance regional infrastructure construction and eco-services provision, and reduce poverty.

3) Based on the current Main Function Zoning Plan, various development objectives, industrial development directions and spatial layout should be more clearly aligned to specific and detailed functional zoning administrative areas in order to improve operability of this zoning. At present there is confusion since the zoning is done at a coarse-grained level. For instance, develop differentiated industrial policies based on fine-grained function zones and resource carrying capacities; and develop land and population policies according to different function zones and development objectives. Then formulate investment policies according to sectoral arrangements within the detailed functional zones, and improve the fiscal system for providing public services and protecting public goods according to local ecological and social conditions. To enforce mandatory protection, define ecological red lines for important function zones, nature reserves, sensitive land and marine areas, and other ecologically fragile areas.

4) The development of eastern China heavily relies on the energy and resources supply from the western part of the country. The payment for ecological services from the east at present is far from sufficient to cover the ecological deterioration suffered

by the west. For central and western regions, establish and improve a fiscal transfer system to guide and support green transformation, and implement a payment system for ecosystem service payments from eastern areas to central and western regions.

5) Adopt the principle of “priority for resource- and energy-saving and environmental protection” in the eastern region. Develop and follow very strict environmental quality standards and related emission targets, such as imposing strict pollutant discharge standards for power intensive and high pollution industries. Enhance technological innovation and management capacities that will increase the competitiveness of green economy components and their products. Fully implement a green tax system covering environmental and resource taxes or other market-based approaches to promote behavioral change of enterprises and consumers. Increase corporate social responsibility awareness, promote green corporate governance mechanisms, and establish green enterprise alliance systems and implement green supply chain management strategies for improved voluntary measures involving business, government and end users of products and services. Seek sustainable consumption through activities such as environmental awareness raising, labeling and information sharing; strengthen public monitoring, with much improved government information disclosure and public participation concerning development decisions, and insist on more adequate public environmental information disclosure by enterprises, financial institutions and other bodies, especially those operating at municipal and provincial levels.

(2) Develop sustainable urbanization plans, and establish urbanization modes adaptive to differentiated regional characteristics.

Exploring sustainable urbanization modes is one of the major challenges for eastern, central and western regions in their process of sustainable development. Differentiated sustainable urbanization plans should be developed for each of the regions.

The eastern region should aim to develop city clusters with international competitiveness, refine the service functions of super-large and large cities, improve the urban habitat environment, promote green transformation of super-large and large cities and create green development patterns within the small and medium-sized cities, and pay much greater attention to the construction of integrated and sustainable urban infrastructure.

Central and western regions should foster eco-cities, strengthen industrial

functions of small and medium cities, enhance public service and functioning of small towns, prioritize the development of medium and small cities with advantageous locations and strong resource/environment carrying capacities, and actively tap the green development potential of current cities.

(3) Strengthen policy enforcement and establish an improved coordination and cooperation mechanism for regional green development and attainment of ecological civilization objectives.

4) China should establish a regional coordination mechanism and improve the capacity of central and western region governments, particularly county governments, to secure ecological civilization and green development. Together with direct investments from the government, a green development fund should be established to encourage green industries, improve the stability of ecosystems of regional concern, and support ecological construction projects. In the relatively developed eastern region, a regional environmental pollution control fund can be established to conduct environmental health risk assessment, provide compensation and resettlement of affected people, remediate the brown fields, and provide funding for pollution control.

5) Implement ecological compensation measures. A compensation fund should be determined according to the ecological function zoning in the eastern, central and western China. Eco-compensation standards need to be established based upon specific ecosystem service requirements. Fair compensation should be paid to rural residents that commit to long-term ecosystem protection. Meanwhile, extend the “polluter pay” principle to the resources and mineral development fields on a much more extensive and well-enforced basis.

6) Tighten the environmental access permission system to prevent pollution transfer on the part of industry migration or other development initiatives such as those related to tourism or new settlements. Implement a strict environmental access permission mechanism, adopt stricter emission standards and pollution control technology requirement to prevent new pollution sources and migration of pollution industries towards central and western regions. Develop regional environmental performance evaluation and assessment methods with enhanced public participation, define indicators, and determine the green development indicators according to main function zoning and regional characteristics. Monitor and evaluate the implementation by enterprises and local governments and enhance the enforcement. Regularly disclose the enterprise and government authorities that are not in compliance with EIA requirements.

RECOMMENDATION 3. Strengthen joint control of air pollution to improve regional air quality.

Pollution by PM_{2.5} and ozone is becoming a prominent problem that poses serious threats to public health. In recent years, the PM_{2.5} concentration in Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta remains at a high level. The haze days occur for 30-50% of a year, and there are ever widening gaps between the officially announced air quality and public perception. Regional air pollution has become an environmental problem that needs to be dealt with urgently, since no one city or even province can adequately address the issue on its own. Improving regional environmental quality requires regional joint prevention and control, coordinated control of multi-pollutants and multi-sources, institutional innovation of regional environmental management and strengthening of management capacity. Our four detailed recommendations are to:

(5) Integrate regional environmental capacity, optimize economic structure and layout, and establish new regional joint control mechanism.

1) Based on factors such as inter-city pollution transmission pattern and air quality status of cities with different environmental carrying capacities, key control areas that have significant contributions to regional air quality should be identified, especially Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta areas. These are areas where there are serious problems of regional and compound air pollution. In these areas air quality monitoring should be strengthened, and regional environmental information sharing platform, joint review/approval system for major projects, and regional emergency response mechanisms should be established. There should be strict controls on new construction projects that are likely to introduce additional air pollutants into areas where planned targets are not being achieved at present, and where air quality is seriously deteriorating. Mechanisms that can help improve regional air quality, such as emissions trading systems, should actively be promoted.

2) Deepen industrial pollution control, advance SO₂ emission reduction, establish industrial NO_x control system focusing on power and cement sectors, deepen industrial smog pollution control, and enhance VOCs pollution control from typical sectors and sources. Multiple pollution control is essential if good air quality is to be secured.

3) A systematic environmental and resource review of domestic automobile

development plan should be conducted. Comprehensively strengthen mobile sources control, implement new vehicle emission standards at proper time to reduce the vehicle emission intensity, and adopt total vehicle quantity control in cities with serious vehicle emission pollution. Develop new sustainable urban transport system. It is necessary to further define low-emission zones and zero-emission zones in the major cities under a regional air pollution control system, and develop management measures accordingly. A total vehicle volume control policy should be explored in mega cities with population of more than 10 millions. Better air quality modeling and better emission inventories are required.

4) Promote multiple high quality energy sources such as natural gas, low-sulfur diesel, LPG and electricity to replace coal. Regional coal consumption growth should be strictly controlled. There should be a continuous increase in the percentage of high-pollution fuel forbidden zones in urban built-up areas.

(6) Revise relevant laws and regulations to provide legitimate guarantees for regional air pollution control.

The existing Air Pollution Control Law cannot adequately address air pollution control under the current situation. It needs to be revised to provide legitimate support to relevant policy measures for new types of pollutants. First, PM_{2.5} and ozone should be treated as the new core need of air pollution control. Besides the further deepening of industrial pollution control, focus should also be put on pollution control of non-point sources of smog such as small and medium boilers, dust, restaurant emissions, decoration painting, small engines, as well as mobile sources such as vehicles. Also pay attention to non-vehicle mobile sources, and include emissions from ship, plane, train and off-road equipment into the coverage of air pollution control laws. Second, keep ambient air quality improvement as the key objective of air environmental management, and clarify the responsibilities and obligations of local government for the compliance of air quality. Third, strengthen the punishment of violators with a view to make non-compliance more expensive than compliance.

(7) Strengthen pollution control and implement multiple-pollutant synergic control.

Establish total amount control method with improvement of air quality as core objective, implement synergic emission reduction of multiple pollutants such as SO₂, CO₂, NO_x, particulate matter and VOCs, etc., and coordinate emission reduction and energy conservation policies. Deepen industrial pollution control, advance SO₂ emission reduction, establish industrial NO_x control systems focusing on power and

cement sectors, deepen industrial smog pollution control, and enhance VOCs pollution from typical sectors.

(8) Increase investment and strengthen science and technology development, and implement a strong national clean air action plan as soon as possible.

It is urgent to establish a special fund at the central government level for air pollution control, enhance the support of science and technology, and implement a national clean air action plan. Establish investment mechanism with diversified investors and modes to direct and encourage active investment from local governments and enterprises on air pollution control. Carry out special studies on generation mechanisms, source analysis and control approaches for air pollution in different regions.

RECOMMENDATION 4. Strengthen marine environmental protection and construct a more balanced approach to becoming a marine power.

While China's marine economic development is accelerating, there has been intensive pressure on the marine environment, with the most critical example being the Bohai Sea. Specifically, with increasing large-scale offshore oil exploitations, the risk of marine oil spill is rising and marine oil spill incidents occur frequently. This problem is exacerbated since there are serious problems of contaminants entering the ocean from the rivers, and also across-the-board, large-scale, rapid-paced land reclamation activities. Also other sectors are expanding, for example aquaculture and tourism, leading to conflicts in use of the marine environment. There is an urgent need to reform the current marine environmental management mechanism, coordinate marine resource development and environment protection, and achieve integrated marine-land economic development and environmental protection. In order to improve marine resource development capability, and to more effectively protect the marine ecological environment, and to approach the strategic goal of China becoming a sustainable marine economy and power, our four detailed recommendations are to:

(5) Speed up the formulation of a robust national marine development and environmental protection plan.

This plan should be based on existing land and marine function zoning plans and national-level development strategies of coastal governments, cover all the coastal zones, and identify fundamental policies and strategies for handling the relations between the marine development and marine environment protection. The plan should

integrate the overall planning of offshore areas with plans for coastal provinces, and establish marine economy and environmental protection areas in the Yellow Sea and the Bohai Sea, the East China Sea and the South China Sea.

Based on the integration of industrial distribution planning in existing land and marine functional areas, one should formulate and revise the coast layout planning of key marine industries and major sea-related industries (especially, offshore oil and natural gas, coastal nuclear power, coastal or port chemical industry, coastal or port irons and steels, coastal real estates), pay special attention to marine ecosystems that preserve high ecological value, but are highly vulnerable to human activities, and incorporate such planning into overall coastal and marine spatial plans. China should also focus on international relationships within marine development and protection, and participate and take the lead in cross-border international and regional cooperation.

(6) Strengthen legislation, law enforcement and governance mechanisms of marine environment management.

The institutional and regulation system for offshore oil field development approval and supervision should be improved with emphasis on environmental assessment as articulated in the *Environmental Impact Assessment Law* and *Regulation on Environmental Impact Assessment of Planning*. There is a need to improve the information disclosure system, establish a unified mechanism of receiving and publishing information, strengthen enforcement of the *Regulations on Open Government Information*, and ensure the public's right to know. It is important to establish and improve the cost bearing system for emergency responses, explicitly identifying the party/parties responsible for the accident and the costs of emergency responses.

The following actions should be taken. Clearly define the liability of enterprises for preparing emergency response plans. Revise relevant laws based on lessons learned from international experience—require the operator and oil company to take the primary responsibility to meet any emergency. The government's reaction to emergency should be supplemental. Develop a more complete set of applicable specifications to enterprises for access permission, operation, and for disaster response. Strengthen corporate environment awareness and responsibilities. Corporate environmental protection capacity will be considered as an essential condition for approval of enterprises' involvement in any activity by marine development. Local maritime courts and procuratorates should be instructed to clearly address enterprises'

legal responsibilities regarding pollution and damages of marine environment arising from their operation. This should discourage enterprises taking any chances. Enhance the prevention of environmental risk from marine-related enterprises, clearly regulate enterprises or other beneficiaries from overdevelopment and illegal development activities, and set in place other sector-specific mechanisms to avoid marine accidents.

Furthermore, there is a need to strengthen the enforcement and supervision capacity of the marine administration authorities, form a unified offshore law enforcement team, establish China's marine environment administrative supervision and law enforcement system, and strengthen the supervision and enforcement of the environment impact assessment system for marine development activities.

(7) Establish national marine emergency response planning system for major environmental incidents.

Based on *National Marine Functional Zoning (2011-2020)*, existing *Emergency Response Plan for Oil Spill in Offshore Oil Exploration and Development* and *Emergency Response Plan for Accidents and Disasters in Offshore Oil and Natural Gas Activities* should be consolidated, and a National Emergency Response Plan for Major Marine Environmental Incidents should be established by joint effort of relevant departments. The system should formulate special emergency response plans and on-site emergency handling plans for various levels and types of potential marine environmental accidents from all risk sources, and define the responsibilities of relevant departments and personnel for various stages of accidents (i.e., before, at the beginning of, during, and after, accidents).

(8) Strengthen the capacity building of science and technology in marine environmental management.

China should require oil and gas operators to invest in regional and national funds for marine environmental research with the aim of strengthening science and technology research on marine environmental management. This will support overall strategic planning of coastal zones and marine spaces, increase capacity for ocean and coastal emergency responses, help improve marine environmental management laws and regulations, developing marine environmental monitoring and early-warning systems, and improve marine ecological loss evaluations and remediation efforts.

RECOMMENDATION 5. Establish long-term mechanisms with environmental quality improvement and risk prevention as objectives to promote strategic

transformation of environmental management and human health protection.

It should be clearly articulated in all environmental laws, regulations, and any documents that comprise China's National Environmental Management System that the ultimate goal of the environmental system is to protect public health and the ecosystem. To achieve this goal, ambient environmental quality standards should be designed based on the scientific understanding of the pollutants' effects on human health and ecosystems and in cooperation with implementing agencies. These ambient environmental quality standards should be assessed, revised, and updated so that they are in line with the latest scientific findings. Environmental monitoring standards and regulations should be developed to accurately measure ambient conditions against the quality standards.

Our nine detailed recommendations are to:

(1) Link emissions control targets directly with achieving specific environmental goals.

A clear distinction must be made between ambient standards designed to maintain pollutant concentrations at environmentally protective levels, and national or regional pollution caps designed to limit total pollutant loadings and control trans-boundary flows. The two policies must be integrated to avoid antagonistic effects especially if market-based implementation policies are applied. Implementation policies should be established that link the interim targets and the improvement of air and water quality.

It is recommended that MEP organize comprehensive research on the environmental carrying capacity of key national development zones and preferred development zones and on the assimilative capacity of river basins. In addition, efforts should be spent in developing sectoral caps for the major industrial source sectors such as electricity, cement, iron and steel and automobile industries.

(2) Develop, maintain and update scientifically sound pollution inventories.

Inventories should be established for air and water pollution sources as well as contaminated sites and sites where chemicals and hazardous substances are located as feed stocks or products. A science-based inventory will enable China to establish criteria for prioritizing and cleaning up the worst sites.

(3) Strengthen institutional capacity at all levels.

At the central level, it is important to integrate water management authorities which are currently scattered among over 10 ministries. MEP should be designated as the lead coordinating agency, with support from the other ministries.

At the regional level, it is recommended to expand the six MEP's Regional Environmental Supervision Centers into Regional Environmental Quality Management Centers.

At the local level, governments should develop and publish mid- and long-term strategies on environmental quality and emissions reduction control, as well as a detailed implementation plan to achieve the ambient environmental standards. Sanctions should be applied in case local governments fail to meet established requirements. Meeting these targets should become the key components of the environmental performance contracts signed by the local government officials.

(4) Improve coordination between ambient air quality standards, vehicle emissions standards and fuel standards.

Continuous efforts should be made to increase incentives for low emitting vehicles and disincentives for high emitting vehicles. The air quality impacts of transportation infrastructure need to be evaluated as part of the planning and permitting process. Authority should be conferred to MEP for fuel quality standards development.

(5) Strictly enforce Environmental Impact Assessment and “Three-Simultaneous” requirements.

Environmental impact assessments (EIA) should be conducted on major government policies, and social and economic development plans. Independent analysis and verification must be carried out to ensure their scientific validity. The public should be given full access to the complete text of EIA reports and be allowed ample time for comments. The construction of projects should not begin until all EIA requirements have been satisfied and a permit issued. In addition, it is necessary to revise the existing legal requirements.

(6) Improve permitting system.

Connections must be established between permit issuance and total emissions control targets to ensure attainment of environmental quality standards. New sources

discharging pollutants covered by total emission control requirements must offset their added incremental discharges.

Enterprises should not be allowed to start up or continue to operate without pollutant discharge permits, and be supported by monitoring, reporting and inspection requirements as established by the government.

(7) Increase penalties for non-compliance and enhance monitoring and inspections.

The responsible party should pay the costs of environmental damage to people or property, or economic losses. Compensation should also cover the costs of reasonable measures taken to prevent or limit environmental damage and for clean-up and restoration of the environment to its previous state.

China must first establish stringent requirements for monitoring (including electronic monitoring), reporting and certification. This should include specific regulations governing quality control and quality assurance.

(8) Improve environmental information disclosure and public participation.

Environmental information should be made available to the public in a timely and accurate manner. Data on air quality in key cities will be disclosed in form of forecast and daily report. Online monitoring data on the quality of surface water should be disclosed every four hours. Data on section water quality in key river basins will be disclosed weekly. Lists of key projects subject to national pollution reduction mandates should be disclosed. Sensitive information such as heavy metal and landfill pollution should be published and followed up in a timely manner. Information on large environmental incidents, as well as the treatment and follow-up measures, should be released in a timely manner. Name lists of key emitters and emitters who violate laws should be disclosed.

(9) Promote the use of market mechanisms.

China needs to increase the use of market-based economic incentive tools such as taxes, emissions trading, and natural resource pricing and establish supporting policies, institutions, and guidance for each of the market-based policy alternatives under consideration. Complimentary laws and regulations and public participation must also be in place. Furthermore, setting up a Clean Production Fund will help provide incentives for existing and new enterprises to adopt clean production

methods.

IV. Meeting with Premier Wen Jiabao

On 14 December 2012, at the conclusion of the AGM, China's Premier Wen Jiabao met with a group of international members of CCICED who made a courtesy call on the Premier.

During the meeting, Wen expressed his appreciation to the members for their concern and support for China's environment and development over many years.

He also said he greatly cherished the friendship with the members, and he expressed his best wishes for the future of CCICED.

Issues Paper

Regionally Balanced and Green Development⁴

(December 12-14, 2012)

1 INTRODUCTION

China seeks to build a society where all citizens will be moderately well-off by 2020. A society in which people and nature can live in harmony. And a nation that will proudly take its place as a key player on the world stage—through its overseas direct investment, its success as a trading and manufacturing nation, and through its contributions to solving global problems including climate change, poverty elimination and sustainable ocean use.

As Premier Wen Jiabao has noted, China still faces a situation of “unbalanced, uncoordinated and unsustainable development.”⁵ Recent analyses have tried to identify how China might turn the situation around by 2030, a time frame of only 17 years from now.⁶ The economic development results achieved over the past three decades, show that positive changes can be made in remarkably quick order within China. However it is inconceivable that further transformative changes can be accomplished without greater attention to and investment in a new relationship between environment and development. This new relationship will be one that is unprecedented among the world’s nations.

The long-term aspiration has been for China to become an *Ecological Civilization*, a view strengthened at the 18th CPC Congress in November 2012 where this concept, renamed *Ecological Progress*, was elevated to the same level as Politics,

⁴ This report is the 11th in a series of CCICED Issues Papers produced since 2002. The report has been prepared by the CCICED Chief Advisors, Dr. Arthur J. Hanson and Prof. Shen Guofang with inputs from members of the Chief Advisors Group and especially from Dr. Zhang Shiqiu, who prepared a major analytical report on China’s Regional Development as the basis for sections of this Issues Paper. The views in this Issues Paper are those of the authors. This draft paper may be modified to take into account additional material and comments arising from the CCICED AGM.

⁵ Speech by Premier Wen Jiabao at Stockholm +40 Meeting, Stockholm, Sweden. April 2012.

⁶ See for example World Bank and Development Research Center of the State Council. 2012. *China 2030. Building a Modern, Harmonious, and Creative High-Income Society*. 448 pp., including Chapter 5. *Seizing the Opportunity of Green Development*; Asian Development Bank. 2012. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. ADB, Manila. 199 pp.

Economy, Society and Culture, as one of the main drivers of the whole society.

The congress called for making great efforts to promote ecological progress. We should raise our ecological awareness of the need to respect, accommodate to and protect nature, incorporate ecological progress into all aspects and the whole process of advancing economic, political, cultural, and social progress, intensify protection of the ecosystem and the environment, work hard to build a beautiful country, and achieve lasting and sustainable development of the Chinese nation.⁷

At Rio+20 Premier Wen called for “a green & prosperous world” in his address.

1.1 Seeking “Balanced, Coordinated and Sustainable Development”

CCICED understands the urgency of today’s environment and development situation in China and Asia, in other regions and globally. Thus, as CCICED enters Phase V of its work (2012-2016), the Council will need to consider topics on balanced regional development, coordination needs, and improved policies for sustainable development implementation within China. Furthermore, CCICED also needs to take into account China’s international situation on environment and development. The latter point was underscored at Rio+20 in June 2012, where it was very apparent that China efforts will help to determine the success of future international efforts on green growth, green economy and green development.⁸ Domestically, it is the right time for strengthened policies and action for broadening the scope and quality of development, given that the decadal renewal of government is underway.

Fortunately much of the necessary groundwork is in place. Especially with the 12th Five Year Plan (12th FYP), which takes a more sustainable scientific development approach aimed at reducing alarming development gaps among the regions; addresses difficult and worsening pollution issues such as NO_x, and soil pollution; and places greater emphasis on quality of life in both cities and countryside. But the fundamental issue of uncoordinated development remains at the heart of many difficulties faced in China.

The economic juggernaut model of development in Eastern China is gradually shifting to other regions and in particular to the very large Western China Region,

⁷ Xinhua. 14 November 2012. *Full Text of Resolution on CPC Central Committee Report*. http://news.xinhuanet.com/english/special/18cpcnc/2012-11/14/c_131973742.htm

⁸ China’s overall sustainable progress and its vision for the future have been summarized in its report to Rio+20. *The People’s Republic of China National Report on Sustainable Development*. Beijing 2012. 100 pp.

raising the spectre of repeating past patterns of high pollution and profligate energy use in new development locations, or even repeating past bad domestic practices in some locations abroad where China private sector investors are active. Now instead of major provinces in Eastern China leading GDP growth, it is provinces in the west. It is not certain that these western provinces and autonomous regions will be able to meet energy and pollution targets.

All parts of China require a new model of development that will be “greener”, will place greater emphasis on domestic consumption, and will set priorities that “put people first.” Of course there can be no “one size fits all” approach. These are dilemmas of balancing regional development, and in designing differentiated regulatory and incentive systems that are also fair and workable.

1.2 CCICED Theme – 2012 AGM and Phase V

At this year’s AGM, CCICED examines Regionally Balanced and Green Development. The choice of wording is very deliberate. One can consider a range of unbalanced development situations in regions of China at the present time, but ultimately all must be transformed into environmentally, socially and economically sustainable forms of development. This will involve many different kinds of actions in both rich and poorer provinces and regions, in the interactions among regions, for example in transfer payments such as eco-compensation, and in new regulatory frameworks to take into account integrated management needs such as for China’s marine and coastal regions.

Green Development has taken on greater significance globally since Rio+20 where there was extensive discussions on Green Growth, a concept that gained political traction after the 2008 financial crisis and through efforts particularly on the part of OECD, and on Green Economy, which has been explored in great detail by UNEP, and well-embraced by countries during Rio+20. Green Development is a term favored in China. Indeed, China is as advanced as any other leading nation in its understanding the value of this concept and related approaches such as Low Carbon Economy and Circular Economy. However, serious implementation gaps exist for all countries, including China, for mainstreaming these good ideas into decision-making nationally and locally.

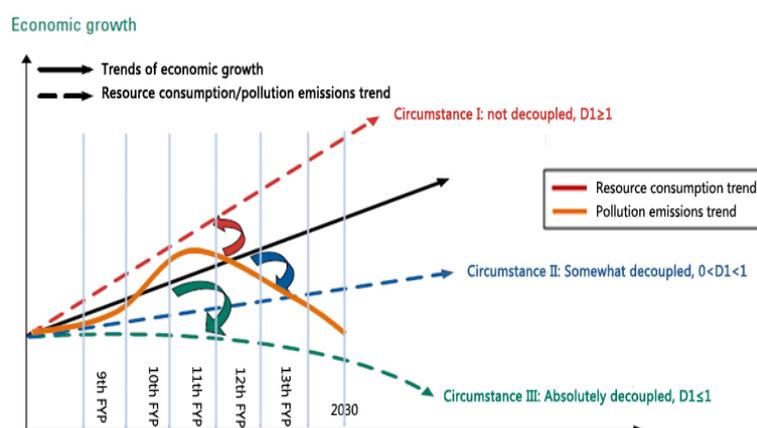
It has been proposed that Green Development be taken as an overall theme for CCICED’s Phase V. Thus it is appropriate for CCICED to explore how Green Development can be more effectively implemented in the various regions of

China—in the immediate future and over the longer-term, certainly for the critical decade of 2020-2030. The 12th FYP is a first big step towards Green Development in China.

1.3 2012 CCICED studies

Five CCICED study teams related to regional and green development will report their recommendations during the 2012 AGM. Their efforts are outlined below:

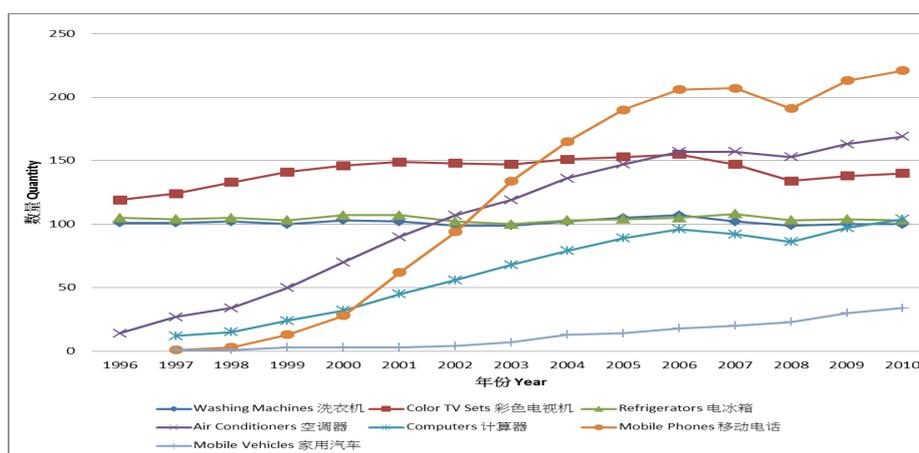
12th Five Year Plan Task Force (12th FYP TF) examined how to achieve mandatory pollution targets of the Plan, with regionally differentiated regulatory needs. The TF also proposed possible environmental protection needs for future Five Year Plan periods, especially for the 13th, 14th and 15th FYPs. This longer-term view underscores the time required to bring complex pollution issues under full control. This TF provides an overarching perspective for the other studies, examining specific pollution control needs for regionally balanced and green development needs in China. The diagram below, from the TF report, illustrates how, nationally, there must be a very major decoupling of resource consumption in order for economic growth to rise and environmental quality to be restored; otherwise environmental conditions will decline from today's levels.



Western China Green Development TF (Western TF) proposed a roadmap for green development in this ecologically and ethnically complex region of China which is home to most of China's remaining citizens still experiencing extreme poverty, has most of China's desertified areas, is the headwaters of the major rivers of China, and holds most of China's biodiversity in its fragile ecosystems. As a consequence of the Western Development Strategy in place since 1999, expanded investments especially for mining and urban development, and migration of industrial operations from other regions of China is taking place. Ecological protection, green industrialization, sustainable natural resource development for both agriculture and mining, energy use, sustainable urbanization and rural development are key Green Development needs. It also is necessary to have a robust approach to climate change mitigation in this vast region. There are fears that local emphasis on GDP growth could

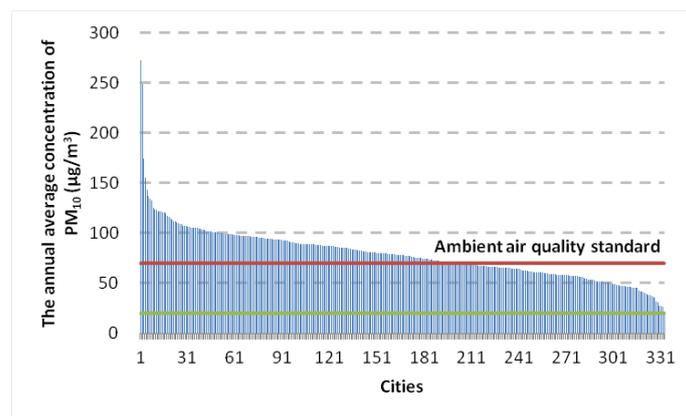
destabilize both ecology and social harmony. This vast region is the most significant in terms of *Main Functional Zoning*, where land and water use zones delineate areas for various levels of protection or multiple use. This promising zoning effort is still at an elementary stage but the initiative highlights the difficult path ahead, since there are major social and economic impacts of any restriction on uses.

Eastern China Development Special Policy Study (Eastern China SPS) was established to consider how the rich eastern coastal region might put in place advanced approaches for Green Development. Some of the sub-regions such as the Yangtze Delta, Pearl Delta, and Beijing are building post-industrial economies in which the service economy will account for more than 50% of GDP. Advanced energy and environmental protection mechanisms; achieving better quality of urban lifestyle; sustainable consumption; green jobs; and greater use of market instruments for achieving Green Development are some of the matters considered by this SPS. Also, how to avoid dismantling and migration of dirty factories to new locations away from richer cities; and how to share environment and development experience from these regions, for example, from major events such as the Beijing Olympics and the Shanghai Expo. The graph below from this SPS report shows the rise in household consumption in Beijing between 1996 and 2010 as illustrated by 7 major items. Clearly some are essential such as refrigerators; others likely could make a positive contribution to sustainable development, for example, mobile phones, and some, including private automobiles and air conditioners, contribute to environmental problems. Multiply the problems of unsustainable consumption within 600 cities throughout China, and the issues of rapid urbanization become very important, especially of the expanding middle class with higher disposable income levels.

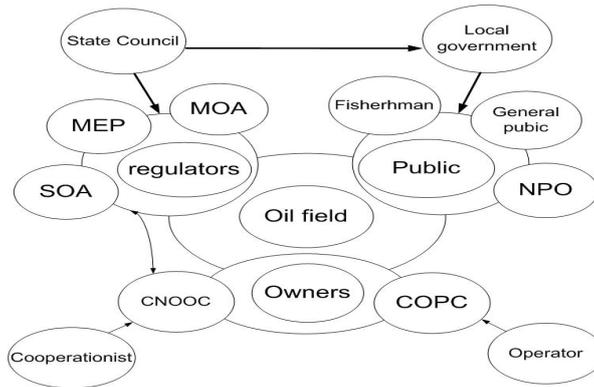


Regional Air Pollution SPS (PM_{2.5} SPS) addressed emerging air pollution problems such as photochemical smog and ozone that have become serious threats even as problems such as SO₂ have been reduced in intensity during the 11th FYP. These new problems are complex since they involve chemical transformation and formation of new compounds, often turning into small particles suspended in the atmosphere (particulate matter, PM). Over the past year there has been considerable public

debate over $PM_{2.5}$, the smallest particles which are particularly dangerous to the respiratory system. These are responsible for turning officially reported “blue sky days” into citizen observed gray days in many cities. Most importantly, no single city can adequately control smog, since airsheds cover large regions. China’s serious air quality problems therefore require regional strategy and policies for complex issues such as $PM_{2.5}$ and ground level ozone pollution control. These emerging problems are still on the rise and likely will require decades to control. This point is illustrated below in a graph from the SPS report, where it is seen that many cities today exceed ambient air quality standard, even for the more controllable pollutants such as PM_{10} . While targets are important, they need to be linked to good regional monitoring information that can demonstrate whether the actual environment conditions (ambient) are getting better.



Marine Oil Spill Prevention & Response SPS (Bohai Oil Spill SPS) examined a 2011 Bohai Bay oil spill associated with offshore oil development. The incident provoked severe reactions on the part of many resource users such as aquaculturalists, with the result that very substantial cleanup costs and compensation payments were required. There is recognition that the Bohai Sea is facing a dismal future unless good environmental planning, management and monitoring is in place, with full cooperation from industries and resource users. In particular, disaster response strategy has been called into question. This study is to give specific guidance on these points and is a very operational follow-up to CCICED warnings provided in 2010 concerning the declining health of this very economically and ecologically important ocean region. The diagram below from a presentation of the Bohai Oil Spill SPS team illustrates a key issue—how to deal with integrated planning, management and emergency response. The actual number of governmental organizations, enterprises and other stakeholders involved is actually much larger than indicated in this summary diagram.



The five studies provide a rich set of examples and recommendations on how to shift towards more balanced and coordinated approaches. In 2011 CCICED examined Green Development in a more sectorally-defined way and at a national level. The 2012 work has drawn upon this earlier work, and takes advantage of other work carried out since that time.

This Issues Paper provides a short review of some current factors influencing economy and environment globally during this past year; gives an overview of the evolution of regional development strategy in China, a complex subject in its own right, plus analysis of how today’s four regions in China can be linked to green development strategy; and concludes with several key issues that are challenges to be overcome.

2 INTERNATIONAL ECONOMIC CRISIS AND GREEN DEVELOPMENT

As the financial crisis that began in 2008 continues to ricochet around the world—even threatening the European Union, and slowing anticipated recovery in the USA and certain other countries. The implications for China have been serious. GDP growth has slowed to about 7.5% year-on-year, manufacturing jobs lost, and international trade reduced. There is hope that China might be a kind of savior for the economies of other countries, or as a source of new investment capital. While this hope may be somewhat misplaced, it is clear that China will continue to expand its investment abroad via its now well-established *Going Out Strategy*.⁹ Furthermore,

⁹ This topic is well covered in the Report of the CCICED Task Force on Investment, Trade and Environment. 2011. *Going Global Going Green*. <http://www.iisd.org/publications/pub.aspx?pno=1615>; also, see http://www.ecfr.eu/page/-/China_Analysis_Facing_the_Risks_of_the_Going_Out_Strategy_January2012.pdf

China has expanded the number of bilateral and multilateral arrangements for investment and trade in Asia, the Asia-Pacific Region and elsewhere.¹⁰ This expansion is helping to rewrite old relationships, and open new opportunities. However, these agreements are not directly tuned into green development or, for that matter, environmental concerns in any systematic fashion.

China's growth continues at a time when much of the rest of the world continues to operate in the shadow of recession. There is widespread worry abroad that sooner or later China could experience much lower growth rates, leading to a downward economic spiral worldwide. This is a simplified view of a complex situation, not completely taking into account all aspects. Notably, China is fostering its domestic consumption, although not with the full-blown approach of the stimulus applied in 2009 and 2010. Also, it does not take into account the major investments made to enhance value-added in China's export products, and the country's innovation efforts designed to open new sectors that could help meet national priorities such as clean energy, while contributing to international sustainable development. Examples are solar and wind energy, and in battery technology.

But it is also apparent that the downturn of economy in other countries and the rise of Chinese share in some of the new technology markets is leading to challenges that threaten some of the new industries. This is particularly the case with complaints recently brought forward to the European Commission, the US International Trade Commission, and the World Trade Organization (WTO) concerning subsidy and trade practices for solar and wind energy products manufactured in China for sale abroad.¹¹ China has responded with complaints concerning EU subsidies on solar panels and complaints regarding US practices. In addition, there are pressure points on other topics such as the requirement for airplanes flying into EU region airports from other parts of the world to participate in the EU emissions trading system. This action has been suspended temporarily following complaints of a number of large countries including the USA, China, India, and Russia.¹²

¹⁰ See for example, China FTA Network <http://fta.mofcom.gov.cn/topic/enpacific.shtml> , and the China-ASEAN Investment Agreement (2009)

<http://www.aseansec.org/Fact%20Sheet/AEC/2009-AEC-031.pdf>

¹¹ *US will place tariffs on Chinese Solar Panels*. 11 October 2012 New York

http://www.nytimes.com/2012/10/11/business/global/us-sets-tariffs-on-chinese-solar-panels.html?_r=0&pagewanted=print , <http://ictsd.org/i/news/bridgesweekly/134029/> *China-US sparring over renewable energy intensifies*

¹² <http://ictsd.org/i/news/biores/150032/> *European Commission announces temporary suspension of aviation emissions law*

The escalation of trade disputes on matters related to important new technologies for green growth and development is unfortunate. Certainly it is not in anyone's best interest to see impediments to the rapid commercialization of environmental goods such as those now being disputed. Price reduction to make these energy sources more competitive against high carbon energy sources is essential. And market size is a primary consideration to make that happen. It is also unfortunate that in the slow movement on Doha Round the issue of exemptions for environmentally beneficial goods is not fully resolved.¹³ Therefore there are gray areas that likely will become contentious as seen over the past year.

Despite the disputes centred on renewable energy technologies and other green trade problems described above, progress has been made in recent months by agreeing within APEC (Asia-Pacific Economic Cooperation) to a planned reduction of tariffs to 5% or less for a long list of environmental goods.¹⁴ This is seen as a "commitment to pursuing green growth objectives, addressing climate change and securing sustainable economic development".

In the 12th FYP China set out lower targets for annual GDP growth nationally, even though actual performance for some provinces remain in the double-digit level. Growth reductions are a realistic appraisal in the face of international economic downturn, but within China they also are interpreted by government as a focus on quality of development, including pollution reduction, greater energy efficiency and protection of ecological services. However, it is a fine line that must be observed—if growth rates fall too much, job creation worries emerge; and if revenues are diminished, funds needed for environmental protection may be difficult to find, or enterprises may be uncooperative.

Chinese leaders have repeatedly noted that they will not ignore the need for environmental protection, and green development. This is an important statement and there is evidence of its implementation, including the commitments made in the 12th FYP. However, this does not necessarily mean that if a more serious global recession were to occur, there would be a repeat of the massive stimulus spending on

¹³ G. Balineau and J. de Melo. 2011. *Stalemate at the negotiations on goods and services at the Doha Round*. Working Paper/P28. FERDI. 29 pp.

<http://www.ferdi.fr/uploads/sfCmsContent/html/112/P28.pdf>

¹⁴

http://www.apec.org/Meeting-Papers/Leaders-Declarations/2012/2012_aelm/2012_aelm_annexC.aspx

environment, such as water and sewage infrastructure, at the level seen in 2009-2010. Indeed, as Vice Premier Li Keqiang has said: “*We should insist on protecting the environment while developing, and developing while protecting the environment, actively exploring China’s ‘new environmental protection way’ characterized as ‘small cost, good returns, low emission, sustainable’.* Create a new situation for environmental protection.”¹⁵ This pragmatic approach should be kept in mind while considering issues and policies related to Green Development. In particular, greater attention to outcomes is needed, since meeting pollution targets or other environment targets does not automatically lead to improved ambient environmental conditions, or lower risks to health of people and ecosystems—the desired outcomes.

Concern is expressed that prolonged conditions of global or national recession will lead to a gradual relaxation of environmental regulations and standards. This view was expressed at Rio+20, including the observation that the meeting outcome might otherwise have been much stronger in terms of commitment to Green Economy. In addition, there is a concern that enthusiasm on the part of investors for renewable energy sources and for bringing new sustainable development technologies to commercialization will slow as a consequence of greater exploitation of non-conventional fossil fuel sources such as natural gas obtained by “fracking” of shale gas,¹⁶ or for other reasons, as biotechnology companies seeking advanced biofuels have found.

China may have advantages in these circumstances. It can invest more in S&T development than most others, and it has potentially large domestic markets. China is improving its capacity to innovate, as measured by patents registered. It is reasonable to believe that China could have significant advantages in moving ahead on sustainable green technologies, even if others fall behind during these lean, recessionary times. This point is a matter of concern for regional development in all parts of the country including Western China—there are many elements of green development such as agriculture and water conservation where there are major innovation opportunities.

The bottom line for many countries, including China is job creation and poverty elimination. There are differing views about the extent to which new green growth strategies and green economy initiatives will produce net employment benefits.

¹⁵ Government Net. 20 December 2011. *Speech by Vice Premier Li Keqiang at 7th Environmental Management Conference*. http://www.gov.cn/ldhd/2011-12/20/content_2025219.htm

¹⁶ <http://news.nationalgeographic.com/news/energy/2012/08/120808-china-shale-gas/>

Certainly UNEP's view is the most optimistic view.¹⁷ OECD does not see green growth as being primarily about job creation, but instead focuses on environmental benefits, and transformative change of industry, energy, etc., leading to fundamental industrial ecology shifts.¹⁸ It is quite possible that the situation will be quite variable, according to national, local or sectoral circumstances. The Rio+20 outcome document¹⁹ is backed by solid analysis that suggests positive employment gains are possible. China could turn out to be one of the best cases in terms of turning green development into net employment gains and for poverty reduction. Certainly green development will be an important driver for creating structural adjustment between secondary and tertiary sectors, with the latter producing the largest share of jobs in the future. This shift will require a very disciplined approach to investment strategy, especially for heavy industry, a point made in current strategic analyses of China's economy.

3 CHINA'S REGIONAL DEVELOPMENT²⁰

The great regional differences in China's geography and environment, resources, and culture, have been important in its historical pattern of development. As well, over the past sixty years, China has experienced several economic reforms as well as major changes in development policy, especially *Opening Up* in Eastern China. In recent years, various social contradictions, and conflicts created by unbalanced and uncoordinated development have affected social stability, economic growth, environmental and ecological protection, social justice and fairness. To resolve problems both nationally and regionally matters, programs for revitalization and for intensive development have been initiated, for example, in Northeastern China and the Western Development Strategy Still, these efforts have been ineffective in producing a genuinely sustainable pattern of development, and for some areas income gaps continue to widen, especially between urban and rural populations.

¹⁷ See UNEP. June 2012. *Building an Inclusive Green Economy for All*.

<http://www.unep.org/newscentre/default.aspx?DocumentID=2688&ArticleID=9169>

¹⁸ See *Green Growth and Sustainable Development OECD and Rio+20*

<http://www.oecd.org/greengrowth/oecdandrio20.htm>

¹⁹ United Nations. June 2012. *The Future We Want*. Rio+20 outcome document.

²⁰ This section is a summary of a longer background document included as an Annex to this Issues Paper. They provide an introduction to the complexities of regional development in China. It is written in a narrative style without full referencing. Further information and a longer document in Chinese prepared by Dr. Zhang Shiqiu is available upon request. We wish to acknowledge the valuable efforts of Zhang Shenghao and Wang Peishen in translations from the original document.

3.1 Evolution of today's regional structure

The modern-day evolution of thought on uneven regional development in China started in 1935 with the famous "**Hu Line**", a diagonal line drawn from China's Northeast to the Southwest, which more or less divides China into western and eastern areas. This line is still relevant today in terms of population density (low in west and high in east), and also in relation to ecological transitions and vulnerabilities.

The line is also relevant to ecological vulnerability and transitions. Landslides, mudslides, and other landform disasters are concentrated along parts of it. The middle part of the line crosses the Loess Plateau, with its erosion and dust storms and main source of Yellow River sediment. The Hu Line is a boundary transiting from waterlogged areas in the northwest region to the flood zone in the southeast, with floods and drought on the east side of the line. This dichotomous pattern was used for planning till the 1980s.

During the 7th FYP (1986-1990), the central government divided the huge inland regions into central and western regions, and producing a clear gradient structure—eastern coastal region, the central inland region, and the western region. This was the period of rapid development of the eastern coastal areas each having their own characteristics: Liaoning Province relies on heavy industry to promote regional economic development; Jiangsu and Zhejiang provinces, on the rapid development of the private economy; Guangdong relied on the open-door-driven policies.

With the implementation of the Western Development Strategy in 1999-2000, coverage of the geographical scope within the three regions changed. Guangxi and Inner Mongolia were reassigned to the western zone, but the three zones pattern did not change. With the first-mover advantage, the Eastern Region continued to maintain rapid development, and, until recently, the growth rate has been generally higher than in the Central and Western regions. Inter-regional development disparities continue to expand. The resource mobilization capacity of the developed areas comes from the market, whereas within the underdeveloped areas, funds from the market mechanism are relatively small.

The Western Development Strategy is the first regional development strategy formally implemented by the central government. Subsequently, in order to resolve the issue of economic structural changes in resource-based cities and to improve efficiency of state-owned enterprises, the government proposed the strategy of

revitalizing the old industrial base in the Northeast Region of China. After that, to balance the regional development and to avoid the collapse of the central region, attention was given to improvements in the Central Region and efforts to accelerate the development of the Eastern Region. Therefore, during the 10th FYP, the pattern of four plates gradually formed.

The 11th FYP proposed an overall regional development strategy, which is *promote the development of the western region, revitalize the old industrial bases in northeast China and other regions, promote the rise of the central region, and to encourage the eastern region to lead the development* as the regional pattern of four plates. The **Eastern Region** refers to 10 provinces and municipalities including Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan; the **Central Region** consists of Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan provinces; the **Western Region** includes 12 units—provinces, autonomous regions, and municipalities—Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang; and the **Northeastern Region** refers to 3 provinces—Liaoning, Jilin, and Heilongjiang Province.

The 12th FYP has placed greatest emphasis on the Western Region and also the Northeast, as noted below the China Daily²¹ in a report of a State Council meeting in January 2012:

China will continue to boost the development of the country's less-developed western and northeastern regions, according to a statement released after an executive meeting of the State Council...The meeting, presided over by Premier Wen Jiabao, has approved guidelines for the development program of China's west and the revitalization of the northeast old industrial bases in the country's 12th Five-Year Plan period (2011-2015)...The vast western region is still a "short plate" in the country's regional development, and achieving its prosperity is an important but difficult task in the building of an all-round well-off society.

Priority should be given to the implementation of the strategy of large-scale development of the western region in the country's overall regional development scheme, to maintain its continued stable and rapid economic and social development...Efforts should be undertaken to keep the growth of the regional GDP and the residents' income higher than the national average in the

²¹ http://www.chinadaily.com.cn/china/2012-01/10/content_14410199.htm

five-year period...More emphasis should be put on the construction of "development priority zones" with their own development focus and priority according to their environmental features, natural resources, current development stage and development potential.

The State Council also underscored the importance of infrastructure construction, environment protection, promotion of advanced industries and agriculture, and the development of small towns and villages, education and opening-up.

The statement said that there were still unsolved systematic and structural problems that have restricted the development of China's northeastern region, and that local governments should continue to deepen reform and accelerate transformation of development pattern in the 12th Five-Year Plan period. The State Council urged those involved to make vigorous efforts to promote agricultural development, further perfect modern industries, and optimize regional development strategy in the northeastern provinces. Local governments should also work to ensure sustainable development of resource-rich cities, improve infrastructures, enhance environmental protection, boost employment and affordable housing construction, and deepen reforms of state-owned enterprises while accelerating the growth of the private sector.

The more developed eastern and central provinces should offer better assistance to the development of these regions, the statement said.

3.2 Building a Well-off Society and unbalanced regional realities

Over the past 30 years, China has achieved a "high-speed" average annual growth rate of 9.6%. Although the national economy is moving towards the desired comprehensive well-off stage, among the various regions economic gains are very uneven. In fact the disparities among regions are multi-dimensional, including level of economic development accessibility towards basic public services and state of ecological wealth. Regional development strategy is intended to confront the challenge of *strong ones getting stronger, and weak ones getting weaker constantly*.²²

The following sections will discuss similarities and differences among the four regions based on eight aspects: degree of accomplishing a Well-off Society, level of

²² An Shuwei, Yu Peng, 2009.

economic development, urbanization, living standards, regional self-development capacity, basic public services, pollutant emissions, and environmental resources pressure. Despite its relevance, we have not examined environmental resources pressure as a separate point since it is not a subject that permits a brief overview and use of numbers like the other measures.

There are six indicators for measuring the efforts towards accomplishing a Well-off Society: economic development, social harmony, quality of life, democracy and rule of law, culture and education, resources and environment. How these are actually measured will not be discussed here, only some results as perceived by the government of China.

Figure 1 shows steady progress in attainment of the Well-off Society goal, but the reality is that only in the Eastern Region is it nearly achieved. The levels of full achievement in 2010 were Eastern Region 88.0%, Northeastern Region, 82.3%, Central Region 77.7%, Western Region was 71.4%. From 2000 to 2010, the highest levels were in the Eastern Region, and the Western Region was the lowest. As cities move towards a 90% level of achievement research indicates a slow-down in meeting the goal. And the indicators do not cover all aspects of what a Well-off Society might be expected to encompass.

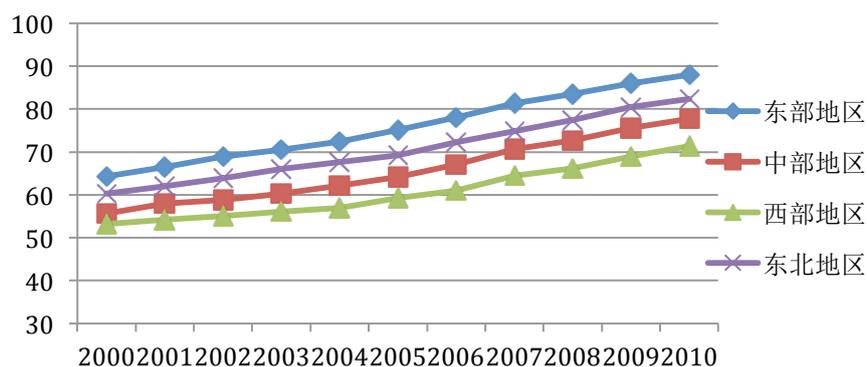


Figure 1. Regional accomplishment in building up a Well-off Society (blue diamond-eastern region; red square-central region; green triangle-western region; purple cross-northeastern region)

3.2.1 Level of economic development and industrial structure

Based on the aggregate GDP, from 1992 to 2010, the Eastern Region ranked first. The GDP of the Eastern Region in 2010 accounted for 57.8% of the national GDP, the Central Region 21.5%, the Western Region 20.3%, and the Northeastern 9.3% of the

national GDP. The year 2007 was a turning point in terms of growth rate. Before then, the fastest growing economy was in the Eastern Region; and the Northeast Region had the smallest economic growth in most years. After 2007, the situation reversed; the Northeast Region had the fastest economic growth, and the Eastern Region became the slowest. In 2010, the Central Region experienced the fastest economic growth with a 14.1% GDP growth rate; the Eastern Region had a rate of 12.9%, the slowest. The Western (13.7%) and Northeastern (13.6%) Regions ranked in second and third place. From 1992 to 2010 the Eastern Region achieved much higher GDP per capita than the national average. In 2010, the GDP per capita reached RMB 45,798.2 a level 1.53 times the national GDP per capita. By contrast the proportion of the Western Region's GDP per capita rose from 67% in 1992 to 75.4% of the national average in 2010.

There also are important difference in the industrial structure of the four regions, meaning a range in 2009 from the Eastern Region stepping into the late stage; the Central and Western Regions just entering to the middle stage; while the Northeastern Region was in the late phase of the middle stage of industrialization. Taken together, the national industrialization level was at the middle stage. These points are important since criticism exists that China has overinvested in heavy industry in recent years. This leads to overcapacity and a search for markets to sell surplus products in China and abroad. And, as the most developed region seeks pollution reduction and energy efficiency, the dirty industries are likely to be moved out, certainly the case in Beijing and Shanghai.

In general there is a major effort to further optimize industrial structure in all four regions. The proportion of the primary industry has declined although the decline in the Northeast has been very small. Among the four regions, the proportion of secondary industry in the Eastern region is steady, and the proportion of tertiary industry (service sector) has increased steadily to the point where some cities such as Beijing now have more than 50% of the economy vested in the tertiary sector, a "post-industrial" situation.

3.2.2 Urbanization

The dramatic shift of China from an agrarian society to one where soon most people will live in cities is unprecedented in scale and vision for the future. Clearly sustainable urbanization must be a priority, and that is a great challenge. With over 600 cities, China faces planning and administrative challenges at an unprecedented scale. It is believed that China's urbanization process involves migration numbers

greater than any other country at any time in history. Cities are the crucible for industrial innovation, and the hub of manufacturing success, but regrettably also the source of much pollution and problems related to land allocation, transportation and many other development issues.

China is on a pathway of urbanization that will see at least 70% of its citizens housed and working in cities. In 2009 the levels of urbanizations in the four regions were: Eastern Region 56.7%, Central Region 42.3%, Western Region 39.4%, and Northeastern Region 56.9%. Increasingly, there are initiatives aimed at improving the models of urban development, for example, through development of Eco-cities, and through designation of some urban areas as Low Carbon cities.²³ A substantial number of Chinese cities are rated as highly polluted on WHO lists and by other international agencies. But there has been progress on both environmental planning and specific issues like water pollution.

3.2.3 Living standard – income gaps

Corresponding to the level of economic development, disposable income of urban residents in the Eastern Region is significantly higher than other regions (Figure 2). In 2010, the disposable income per capita of urban residents in the Eastern Region was RMB 23,272; the differences among the Central, Northeastern, and Western regions are very small, RMB 15,962, RMB 15,941, and RMB 15,806, respectively. From 2000 to 2010, the net income per capita for Eastern Region rural residents was much higher than the other three regions, increasing from RMB 3,588 to RMB 8,143. In 2010, the ratio of urban to rural income was 2.48 in the northeastern region, 2.86:1 for the Eastern Region, and 2.90:1 for the central region. The urban-rural income gap in the western region is relatively high, a ratio as high as 3.58:1 (Figure 3).

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<http://usatoday30.usatoday.com/news/world/story/2012-07-15/china-building-green-cities/56219286/1>; see also *Eco-cities A Global Survey. 2011*. This survey, conducted by the University of Westminster International Eco-cities Initiative, indicates that China likely has the largest number of eco-cities found in any country. <http://www.westminster.ac.uk/?a=119909>

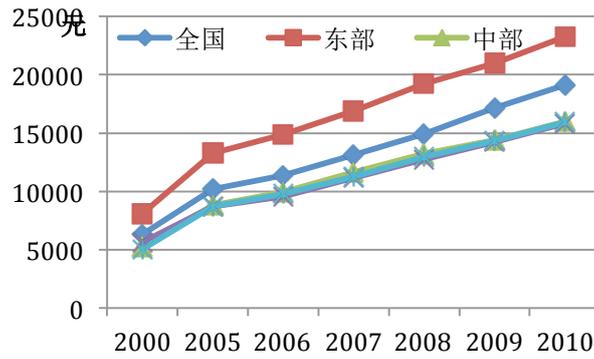


Figure 2. Disposable incomes per capita of urban residents 2000-2010 (blue diamond-national; red square-eastern region; green triangle-central region; purple cross-western region; turquoise cross-northeastern)

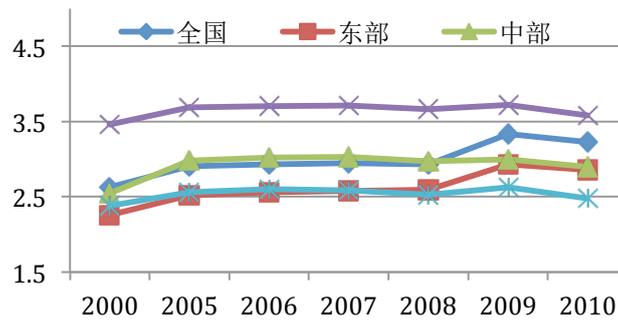


Figure 3. The income gap between urban and rural inhabitants in China's regions (blue diamond-national; red square-eastern region; green triangle-central region; purple cross-western region; turquoise cross-northeastern)

3.2.4 Regional self-development capacity

Capacity to undertake regional development includes the ability to raise revenues locally. Certainly the Eastern Region is best placed to do so (see Figure 4, describing total locally-raised fiscal income levels). The Western Region has shown considerable increase in capacity since about 2007.

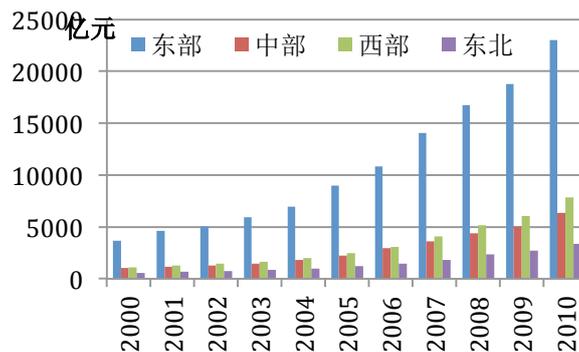


Figure 4. Fiscal income level in billion yuan (based on prices of the years) (blue-Eastern, Red-central, Green-western, Purple-northeastern)

Another useful measure of self-development capacity is the proportion of local fiscal revenue in local fiscal expenditure. This figure is relatively stable over the decade for each region but dramatically different between regions (see Figure 5). In 2010, the percentage ranged from 76.2% in the Eastern Region to 36.8% for the Western region.

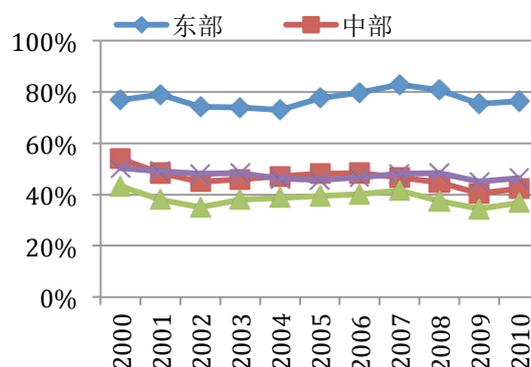


Figure 5. Proportion of local fiscal revenue in local fiscal expenditure (blue diamond-eastern region; red square-central region; green triangle-western region; purple cross-northeast)

3.2.5 Public services

Public services have advanced considerably in all regions over the past two decades, in both urban and rural areas. The rise has been particularly significant in the last decade, including the efforts brought about through post-2008 stimulus expenditure. Here only a few examples are profiled. For example, there are significant difference in the proportion of people with a college degree or higher: in 2009 the figures were 9.02 % for the Eastern Region, 6.1 % for Central Region, 5.6% for Western Region, and 9.07% for the Northeastern Region. In fact, the regional disparities have grown over the period 2005-2009.

For water conservancy, environment and public facilities management industry, from 2003 to 2010, there were significant differences among the four regions in fixed asset investment in such services. After 2007, the Eastern Region's fixed asset investment in water conservancy, environment and public facilities management industry grew significantly faster than the other three regions (as shown in Figure 6).

Both road and railroad mileage increased very dramatically in the past decade, with much of the development in the Western Region (see Figure 7 for road expansion between 2005 and 2010 according to region).

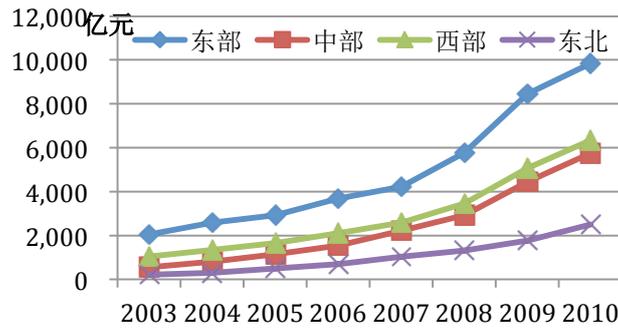


Figure 6. Fixed asset investment in water conservancy, environment and public facilities management industry (blue diamond-eastern region; red square-central region; green triangle-western region; purple cross-northeastern region)

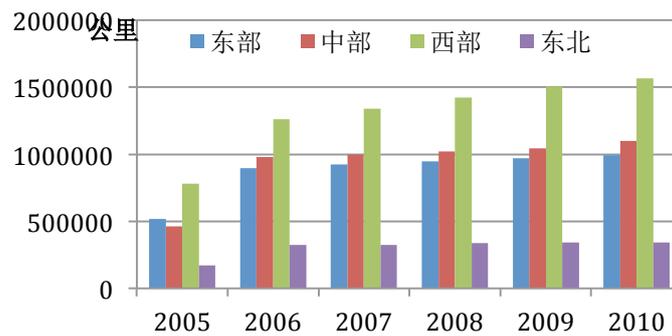


Figure 7. Operating mileage (km) of roads by region (blue-eastern; red-central; green-western; purple-northeastern)

3.2.6 Pollution emissions and environmental emergencies

In 2002-2010, for water pollution the Chemical Oxygen Demand (COD) emissions in tonnes per unit of GDP (billion RMB) showed a declining trend in the four regions. This is, of course, an intensity measure rather than an absolute decline in pollution. The convergence of figures is of interest. Western China started at a much higher level of intensity, and yet was relatively close to the intensity of other regions by the end of the decade (Figure 8).

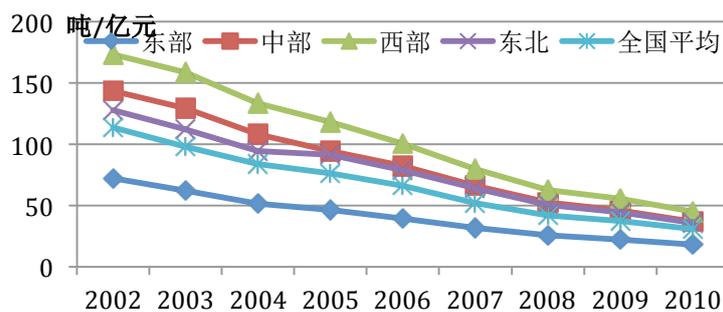


Figure 8. Chemical oxygen demand (COD) mission per unit of GDP (tonnes per

billion RMB (blue diamond-eastern region; red square-central region; green triangle-western region; purple cross-northeastern region; turquoise cross-national)

Between 2002 and 2010, the sulphur dioxide emissions per unit of GDP also displayed a declining trend in the four regions (Figure 9).

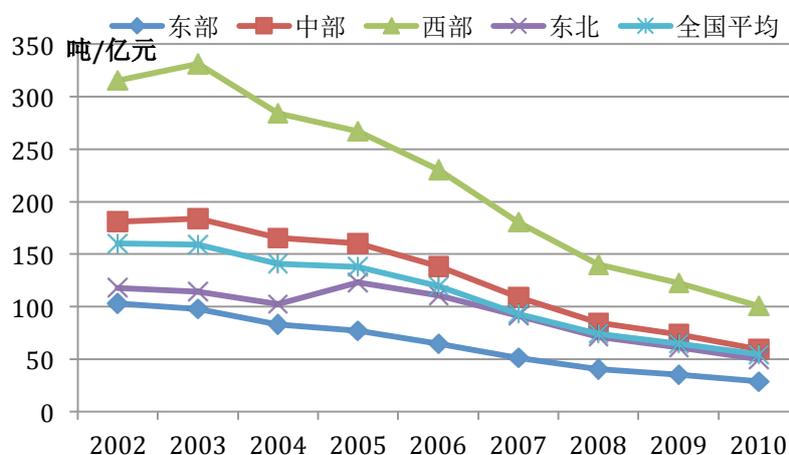


Figure 9. Sulphur dioxide emissions (tonnes) per unit of GDP (RMB) (blue diamond-eastern region; red square-central region; green triangle-western region; purple cross-northeastern region; turquoise cross-national)

From 2002 to 2010, within the four regions, the number of environmental accident emergencies has generally reached a lower level (Figure 10). In the Northeastern Region the numbers have generally been at a lower level, although with some serious incidents. In the Western Region, the number of environmental accidents dropped from 893 in 2002 to 67 in 2010; in the Central Region, the number decreased from 621 in 2002 to 53 in 2009. The situation in the eastern region is very different. Starting in 2008, the number of environmental accidents has again been increasing, from 172 in 2006 to 255 in 2009.

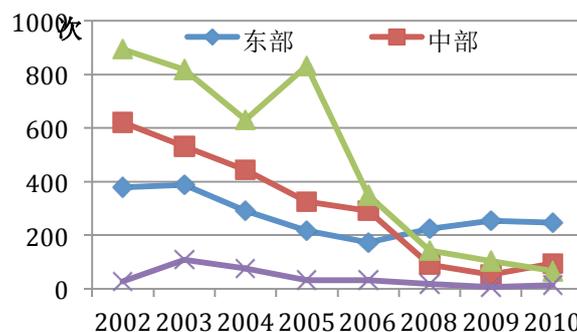


Figure 10. Emergency environmental accidents 2002-2010 (blue diamond-eastern region; red square-central region; green triangle-western region; purple cross-northeastern region; turquoise cross-national)

3.3 Summary observations on unbalanced regional development

There are many hypotheses and conclusions about regional development. However there is not really a consensus on which conclusions are the most important, or even the most credible. Furthermore, the most relevant and appropriate metrics for green and sustainable development still need to be identified. Nevertheless there are some points that cannot be ignored including those noted below.

3.3.1 Regional performance characteristics

(1) The Eastern Region is at the highest level of economic and perhaps social development, but certainly this has been achieved at a very high environmental cost. Yet there is no full picture of the costs, especially in terms of cumulative impacts, and costs related to health and well-being of ecological services, human health, plus economic productivity reductions.

The economic strength of the Eastern Region continues to lead the country with the aggregate GDP and GDP per capita significantly ahead of other regions; the tertiary service sector is developing rapidly, and drives further optimization of the industrial structure. But in recent years, economic development has slowed down, and the high dependence on foreign trade has led to development influenced strongly by the international situation including global economic volatility. People's living standards in the Eastern Region are in the leading position—the disposable income per capita of urban residents and net income per capita of rural residents rank first among the four regions. In addition, the infrastructure of the Eastern Region is the most complete. However, the level of urbanization lags behind the level of industrialization, and the income gap between urban and rural residents is growing. Migrant workers from other regions, or even from rural areas in the Eastern Region do not have access to full social benefits accorded urban residents.

(2) The Central Region shows many signs of advanced development, but with bottlenecks.

The aggregate economy of the Central Region has continued to increase, and its national proportion shows a rising trend. Living standards improve very fast; the growth rate of net income per capita for rural residents is the highest among the four regions. The construction and development of infrastructure is good. However, the level of urbanization improves slowly, and still lacks coordination with industrialization.

(3) The Western Region has made substantial progress, but still has the lowest level of comprehensive development. There are still major concerns related to the human dimensions, including poverty reduction, income gaps and education; and to ecological fragility, especially at a time of more rapid infrastructure and mineral development, and with pressures from agriculture and grazing on landscapes, Furthermore impacts of climate change and other factors affecting water and ecological services are being experienced. Entry conditions for enterprises are not well worked out. More adequate monitoring and standards are needed.

The economic development of the Western Region has been significantly accelerated, and the overall economic strength has continuously improved, but its overall economic development is still lagging—GDP per capita is at the bottom of the four regions; there is rapid increase in the level of industrialization, but the industrial operational level is low, and the structure is unreasonable. The growth rate of disposable income per capita of urban residents ranks first in the four regions; the income gap between urban and rural residents is the highest, but the net income per capita of rural residents is lowest.

Infrastructure development needs, low level of basic social services, strong dependence on the central support policies, and weak self-development capacity have seriously restricted the economic and social development of the western region. In addition, COD and sulphur dioxide emission levels of the Western Region ranks highest among the four regions, and ecological damage is very severe. The change of economic development mode is urgent. Furthermore, sustainable development in Western China is a prerequisite for environmentally sustainable development of all China, as downstream impacts from degraded watersheds, polluted airsheds and soils will affect the other regions.

(4) The Northeast Region has a good development foundation, but relatively low growth.

Economic development of the Northeastern Region overall has a relatively strong capability—GDP per capita, and the level of industrialization is right after the Eastern Region. But economic structural changes are difficult; the development of high-end industry and modern service industry is not good enough; upgrading the industrial structure is proving to be a hard task. However the net income per capita of rural residents is only lower than the Eastern Region; the income gap between urban and rural residents is the lowest, and presents a continuously shrinking trend. In

addition, the development of education in the Northeastern Region is excellent; the level of urbanization ranks first in the four regions, and human resources are well positioned for economic restructuring, perhaps better than other regions. In recent years, infrastructure development, for example highways, has been slow; urbanization is lagging behind industrialization to a certain extent.

3.3.2 Environmental performance

The environmental performance of the Eastern Region is better than that of the Central and Western regions, especially during the 11th FYP. Whether the total discharge of pollutants, emissions per unit of output value, or the quality of the urban environment, the Eastern Region appears better than the Northeastern, Central and Western regions. Yet, the advent of serious emerging problems in Eastern China, mostly related to development of the last decade may yet change this observation. Marine and coastal concerns such as oil spills and other contaminants, soil pollution and the major air pollution problems such as smog and ozone are pressing matters, with very significant health impacts in some of the richest cities, and with a spread across regional airsheds. Furthermore, the ecological footprint arising from development in the Eastern Region extends far beyond its boundaries as a result of rapidly increasing material demands.

3.3.3 Poverty reduction and income disparities

Although China has made very major gains in dealing with the Millennium Development Goals, the job is not yet complete, and income gaps are growing both within and between regions. Peng Tengyun and Xu Yong respectively utilized the Gini and GE (generalized entropy index) methods²⁴ and concluded that uneven development in China is expanding according to the data from 1995 to 2003. However, this expansion of income has been relatively slow since there has been a general uplifting of economic conditions. Referring to data from 1993 to 2003, Li Qian and other scholars (2006) found that the tendency of uneven regional development expanded after 1993 as measured by per capita GDP, in which the contribution of Central and Eastern Regions exceeds 50%. The research of Jin Xiangyu and Hao Shouyi (2006) shows that after the start of Chinese Economic Reform, especially since 1990, among the 31 provinces and municipalities as well as

²⁴ For explanation of these terms see Fernando G De Maio. 2007. *Income inequality measures*. J. Epidemiol Community Health. 61(10): 849–852. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2652960/>

the Eastern, Central and Western regions in China, uneven regional development is expanding.

The data analysis of the per capita GDP gap coefficient in China shows that this gap coefficient has gone through shrinking (1978-1990), expanding (1990-2004), and then shrinking again (2004-2010) phases, forming a reverse U shape. The analysis of the data in the years of 1978 to 2010, after the Chinese Economic Reform, shows that the Gini coefficient started to fall from 1978 to 1991, and then rose in the years 1991-2003, then fell again in the years of 2004-2010.

3.4 Causes of regional development imbalances

Regional economics as well as national economic development provide explanations for the uneven regional/area development in China. But various other factors significantly affect regional development. These factors include government policies, macroeconomic factors, regional resource endowments, liquidity of elements, and interactions among these factors. No single theory can fully explain unbalanced regional development in China. In pragmatic terms, there are a number of factors that in the past have been important and will continue to be significant as China attempts to narrow development gaps. These include natural endowments and the cumulative effects of six decades of planned development. There are historical origins of the imbalance in regional development mainly manifested in two aspects: available infrastructure, and social capital. Regional social capital will influence the economic efficiency, including efficiency, sense of competition, cultural traditions, and education structure. These points are discussed in more detail below.

3.4.1 Differences in geography and natural resource endowments

Access and transport lead to important transaction cost differences. The improvement of water transportation (especially marine transportation) and land transportation cost-savings, have been advantageous for coastal areas especially for expanding international trade. Inland western regions have significant disadvantages due to inconvenient transportation linkages resulting in high transaction costs.

Resource development costs tend to be higher in the Western Region by comparison to Eastern Region in particular. Although mineral resources are abundant, those located in distant high mountain areas are difficult to access, extract and process. Costs are therefore high. The natural resources buried in the mountains are difficult to extract, and costs also higher.

Quality of agricultural development varies considerably, with the Eastern Region and parts of some other regions being favorably endowed, and close to high population markets. By contrast, for much of the Western Region's vast lands the quality and potential are lower and subject to environmental risks including climate change impacts, erosion, etc.

3.4.2 Strong correlation between ecologically-fragile and poverty-stricken counties in the Central-Western Region

Within Central and Western regions, of the counties recognized as ecologically sensitive areas, about 76% are also poverty-stricken. For ecologically-sensitive areas, about 43% of such lands lie within poverty-stricken counties. For arable lands classified as ecologically sensitive areas, 68% is located within the poverty-stricken counties, accounting for 74% of the total arable land of the poverty-stricken counties. And, for populations living in areas classified as ecologically sensitive areas, about 74% of such populations live in poverty-stricken counties, accounting for 81% of the total population of these poverty-stricken counties. These figures suggest that the relationship of ecology and poverty in at least some of the poorer areas of China is significant, likely complex, and certainly a significant matter to be considered for sustainable development.

3.4.3 Cumulative effects of development history over 60 years

China's development policy has undergone three stages, including: the stage of focusing on the development of basic agriculture and industry; the stage of implementing the regional gradient development strategies and eventually prioritizing regional development of the Eastern Coastal Region with an emphasis on *Opening Up*, accompanied by economic and some financial and political reforms; and the stage of implementing balanced development strategy, including the Western Region Strategy.

The economically well-developed regions obviously have benefitted greatly from preferential policies of the national government.. The disparities of the *Opening Up* period led to a more open economic environment in some cities while others remained closed to outside investment. Prioritizing the coastal economic system reform created crucial differences in regional development. From a practical point of view, areas with the *Opening Up* pilot project experience got rid of the rigid planning system first, stimulated their economic vitality, and realized the rapid development of the private economy. In addition, geographic advantages could be optimized, such as access to cheap shipping from coastal ports.

3.4.4 National development strategies and plans during different periods

From 1949 to 1972, the government's strategy was even development; during this period of time, the priority was given to the development of the backward inland areas. By setting up heavy and chemical industries in the inland areas, this strategy was trying to change the previous eastern-oriented layout for heavy and chemical industries. The Central and Western regions invested in low value-added mining and energy industry, whereas the East Sea coastal area was focusing on processing industry. Therefore, with regard to industrial structure, the Central and Western regions were in a disadvantaged position. From 1973 to 1978, China's development strategy gave priority to the development of coastal areas.

During the 6th FYP (1981 to 1985), the government emphasized setting up regional development strategies based on regional comparative advantages. At this stage, the development strategy was gradient development from coastal to inland. The coastal areas had the priority to optimize the industrial structure, build up infrastructure, and participate in international trade and investment. Inland areas needed to develop energy, transportation and raw materials industries to support coastal areas. The special economic zones and opening-up policies were implemented, mainly along the south coast, especially the Pearl River Delta, and including Zhuhai, Shantou, Xiamen, and Hainan special economic zones plus 14 opening cities. Overall, the eastern coastal areas gained greater autonomy in finance, taxation, prices, investment, credit policy, and the eastern coastal areas have relatively greater institutional innovation space.

From 1991 to 2000 (8th and 9th FYPs) the development strategy aimed to coordinate development of regional economies and reduce regional disparities. It adopted a series of policies to stimulate the development of inland areas, including increasing the funds for the infrastructure construction of the inland areas, attracting foreign investment for the inland areas, and guiding the collaboration between inland and coastal areas. The Special Economic Zones began to expand from the southern coast (southern section) to the central coast and the northern coast, forming the Yangtze River Delta-centred "middle section" and the Bohai Bay-centred "northern section". Meanwhile, the regional development focus moved from the eastern coast to the central and western regions, especially from the east to the west along the Yangtze River Valley.

Starting with the 1999 Western Development Strategy, the government tried to implement balanced and coordinated development. The Western Development

Strategy focused on attracting foreign investment through improving the basic infrastructure and business environment, with the hope that the Western Region could catch up with the development in the Eastern Region. However, based on actual results, the regional disparities between the eastern and western region were not significantly lessened. In addition, the government promoted the “Revitalization of the Northeast Industrial and Other Old Industrial Bases” strategy (2004), “the Rise of Central Region” Strategy (2006) and other policies, such as to increase transfer payments. Now, in the 12th FYP, the government aims to reduce regional disparities and seek coordinated regional development.

3.4.5 Regional industrial structure

The industrial technical content, added value, and economic scale of different regions are different, leading to differences in how fast industries can change and advance. In the Western Region, the main industry has been primary industrial raw materials processing. In the development of a heavy industry strategy in the Central and Western regions, many large and medium-sized state-owned enterprises have been established; most belong to low value-added extractive industry and energy industry, and raw material industry with low processing depth and level. These industries are hard to integrate into local rural industrial structure and further promote the development and growth of the rural township enterprises. After the Chinese Economic Reform, the Eastern Region gave priority to the development of high value-added industry including finance, trade, information, and communication. The Western Region became a periphery zone of agricultural and other primary products, resulting in the expansion of inter-regional disparities for more than 20 years. Qin Chenglin’s (2011) analysis shows that primary industry has made a great contribution to resolving the issue of regional development imbalances in China. Contributions of other industries including service industry, the wholesale and retail industry, hospitality industry, and the financial industry to the uneven regional development in China ranked at the second, third, and fourth place respectively.

3.4.6 Regional marketization and ownership

At the moment, the marketization level of the Eastern Coastal Region is relatively high; collective, private, foreign and other non-state-owned economy have all made relatively large contributions. The situation in the Western Region is the opposite. Wang Feng (2007) found that regional differences in human capital, the development of a non-state-owned economy, and the extent of opening to the outside world are important causes of the imbalance of regional economic development in the

present stage. Wang Xiaolu and Fan Gang (2004) pointed out that the economic growth gap between the Central-Western regions and the Eastern region is mainly due to the low productivity. This issue depends mainly on the regional difference of technological progress and marketization. In terms of marketization, the disparity between the eastern and western regions is very significant, particularly, the regional disparities on the non-state economic development and factor market development (capital, labour, land).

Regional restrictions have existed for a long time in the capital market and the labor market in China. Specifically, the inter-regional free flow of labor cannot be achieved; imbalance exists in regional investment. These factors are an important cause of the differences between the coastal and inland areas. In addition, technical workers prefer to find higher-paying job in the coastal areas. Also, there are differences between the coastal and inland areas on the growth of investment, financing structure, and the efficiency of funds allocation. These factors can amplify regional differences. Furthermore, the imbalances in regional development cause labour migration to the well-developed regions, and therefore intensify the regional differences.

3.4.7 Central fiscal policy

At present, the central government promotes regional coordinated development through fiscal transfer payments and by improving public services. To accomplish fiscal transfers payment, the government changed the previous decentralized fiscal tax system to the current tax sharing fiscal tax system. As a result of the reform, the central fiscal income has accounted for a big proportion of total fiscal revenue and changed the former situation of local fiscal domination for some areas. As the central government has gained more revenue, it can provide more subsidies for the less developed regions. The design of central government's fiscal policy design is not based on local economic development and sources of revenue growth, but on the average of recent years' fiscal revenue and expenditure. Regions like Eastern China with larger fiscal expenditures and higher potential for economic growth benefit by gaining more income.

3.4.8 Chinese Economic Reform policy (globalization and economic liberalization)

Globalization and economic liberalization amplify the regional disparities. Through export and foreign investment, globalization promotes economic growth; adopting advanced technology promotes economic growth and competition among

enterprises. The Economic liberalization promotes economic growth by optimizing the resources allocation. However, at the same time, owing to the regional difference in resource endowments, economic structure, and policy, globalization and liberalization may broaden regional disparities.

Chinese Economic Reform policy implemented policies preferential to the eastern coastal regions, including low tax rate, high financial return, and permission to use land for high-tech industrial development. This situation benefits the eastern region in many ways, for example, through better utilization of foreign capital for economic development, accumulating capital from international trade, introducing advanced technology, and adopting good management experience. Over the past 20 years of economic reform, market-oriented foreign direct investment and private investment drove the large amount of capital flows to the Eastern Region with accelerated economic growth results, but also expanding regional disparities. Commercialization of scientific and technical achievements in the Central and Western Regions is still very low. The resulting disparities in human capital between the Eastern and the Central-Western regions have become an important factor in regional differences.

3.4.9 Role of policy interventions

In the 8th FYP, China began to focus on more even regional development, and proposed coordinated regional development strategy: *to handle and perform regional advantages and the national coordination of planning, and the relationship between the coastal and inland areas, the economically developed regions and less developed regions, motivating the regional economy to move towards reasonable division of labor, performing advantages, advantages of complementarity, and coordinated development direction*. This strategic thinking was further explained and specific measures identified during the 3rd Plenary Session of the 16th Central Committee of the CPC as the *Five Overall Arrangements*. Strategies like the development of the Western Region, the rise of the Central Region, and the revitalization of the old industrial bases in the Northeastern Region aim to narrow the regional development gap and to promote more even regional development and targeted measures.

The specific contents of the *Five Overall Arrangements* are to:

actively promote the development of the Western Region, revitalize of the old industrial bases in the Northeastern Region and other regions, promote the rise of the Central Region, and encouraged prioritization in Eastern Region development;

continue to highlight advantages of the various regions and enthusiasm, improve the market mechanism, cooperation mechanism, mutual aid mechanisms, support mechanisms, and gradually reverse the trend of the regional development gap, forming the new pattern of the western and central regions to promote each other, to take advantage of complementarities, and to promote common development goals.

The 16th Plenary Session of the Fifth CPC Central Committee passed *the suggestion of the 11th FYP from CPC on the national economy development and social development*. This *suggestion* promotes the healthy development of urbanization, adherence to coordinated development of medium and small cities and small towns, improvement of the overall carrying capacity of cities and towns; continue to upgrade the driver and radiation effects of the Pearl River Delta, Yangtze River Delta, and the Bohai Sea region on the mainland's economic development; and continue the role of special economic zones and the Pudong New District of Shanghai, while stimulating the economic development of Tianjin Binhai New Area, and other areas with advantageous conditions.

The Decision of the Central Committee of the Communist Party of China on Several Important Issues on Building up the Socialist Harmonious Society passed by the 6th Plenum of the 16th CPC Central Committee, mentioned:

implementing the overall strategy for regional development and promoting coordinated regional development to form a regional industrial structure with reasonable division of labor, obvious characteristics, and complementary advantages, and to promote the common development of all regions; increase support to less developed areas and difficult areas, improve the infrastructure and the education, health, cultural and other public service facilities of the central and western regions, and gradually narrow down the gap among the regional basic public services; improve the support for the old revolutionary base areas, ethnic minority areas, border areas and poverty-stricken areas as well as major grain producing areas, mineral resources development areas, areas with ecological protection challenges, and ethnic groups with small population; support the economically developed areas to accelerate industrial structure optimization and industrial transfer, support the advantageous industrial projects in the Central and Western regions to speed up the transformation from resource advantages into economic advantages, encourage the Eastern region to help the development of the Central and Western regions, expand the developed areas to provide related assistance to the less developed areas and ethnic minority areas, form the mutual benefit mechanism with government as the leader, market as the channel, enterprises as the mainstay, the project as the carrier, establish a system for resource exploration with the pay to use and compensation mechanisms, put up

measures to support the implementation of regional economic transformation in areas confronting resources recession and depletion.

Corresponding to the above policies, the government controls and regulates the developmental spaces through planning, policy, investment, and other measures.

Measures aiming to balance and correct regional development disparities include:

- *Improving management of land resources.* This is the measure that most governments try to implement. China has strengthened the planning and management of land, including 18 million acres of arable land with red line protection.
- *Developing better regional policy.* For example, when implementing the development of the Western Region, carrying out the Northeastern Region revitalization, and promoting the development of poverty-stricken areas the government carries out a series of preferential policies to support the region to accelerate development.
- *Improving overall planning.* The central government already has prepared some 86 regional planning or guidance documents. The major contribution of those efforts is to provide functional orientation for regional development, and clarify the role for each area in the national socio-economic development. Better coordination of plan implementation, attention to overlaps that create clashes between objectives, and other efforts towards integrated planning and management must become key priorities.
- *Promote infrastructure construction and implement of major land improvement projects.* Construction of the Qinghai-Tibet Railway and much other highway length and other infrastructure is intended to improve the conditions for regional development.

In 2006, the national 11th FYP put forward promotion of the regional main functional areas. Regional main functional area planning is based on: the region's resources and environmental carrying capacity, existing development density and development potential, consideration of the future of China's population distribution, economic layout, land use, and urbanization patterns, and division of the land space into classes based on development potential and protection needs. Areas suitable for future large-scale accumulation of population and industries would become the development class areas, and ecologically sensitive areas would be the protected class area. Within these general categories, according to the degree of capacity and sensitivity, areas will be further divided into four main functional areas: optimized

development, key development, limited development, and prohibited development areas. Different regions have different functional orientation and assessment index systems (Zhang Xiaorui and Zong Yaoguang, 2010). The regional main functional area planning helps to go beyond ecologically insensitive administrative divisions, with the hope that better coordinated allocation of resources can achieve balanced social, economic and environmental development. However, the planning of the regional main functional areas is still at the elementary stage operating at a scale sometimes too coarse for use in local planning.

3.4.10 Multiple factors at play

Uneven regional development in China is the outcome of many factors. First, the economic geography, history, and a variety of factors lead to the situation that the level of economic development of coastal areas is higher than the inland areas. This is an early gap effect, that is, during the early stage of development, the gap of income per capita or starting points has a major role in enlarging the disparity at a certain stage. There can be cumulative effects. Second, the national gradient development strategy and tilt policy accelerate the trend of enlarging the economic disparity between coastal area and inland area due to the benefit gained from participating in the globalization and liberalization of the economy. Third, among different regions in China, the investment model is very different. The investment in human capital in developed coastal area is significantly higher than the central and western inland regions. The return on investment in human capital, social capital, and intangible capital is higher than the return on investment in the development of natural resources, physical capital, and tangible capital.

4 SOME KEY ISSUES

4.1 China's environmental still faces serious challenges despite vigorous mitigation efforts.

The pressures on environment continue to rise as a consequence of China's rapid development even though there have been important advances in pollution control and other environmental planning and management efforts especially in the 11th and 12th FYPs. Current efforts will help, especially transformative changes in the economy related to industrial restructuring and improved regulation and market-based incentives. There have been enhanced efforts to address the most difficult pollution problems such as non-point agricultural pollution sources, and photochemical smog. However, there remain institutional cooperation and coordination issues,

implementation inefficiencies, and great difficulties in the conduct of integrated environmental planning and management. These systemic issues will continue to hold back progress unless they can be tackled effectively.

Overall there is a need for accelerated efforts to tackle significant challenges in the environment and economy relationship of China, especially in the implementation of Circular Economy, Low Carbon Economy, and Green Economy. The continuing decline of ambient conditions needs to be stopped during the 12th and 13th FYP periods, so that environmental protection guarantees can be well implemented during the decade after. Then China can truly meet its expectations for an Ecological Civilization and Ecological Progress. By 2030 to 2035, the main environment and development problems of today should be solved, or well on the way to solution. The tasks are massive for this to happen well.

The sobering thought is that new issues will continue to emerge, especially as China's domestic consumption expands, and as Climate Change impacts are expressed throughout the country. China is already encountering various limits and scarcities created by a variety of factors, including push-back from citizens concerned about development, from high food, energy and many other demands on natural resources, and, internationally from matters related to trade and investment and from the increasing demands linked to regional and global environment matters. Expectations are high on the part of China's citizens and from the global community that China will play a growing role on green development internationally, including transfer of its best experiences into other developing countries.

There are also emerging opportunities associated with the transformative changes required in environment, economy and development relationships. Green development and sustainable development will produce new streams of revenue as well as jobs and better quality of life. Turning these hopes into reality will require that the current efforts to mainstream environment into economic and social decision-making must be considerably strengthened—at the national level, and within all regions of China.

As CCICED's 2012 study reports indicate, whether a region in China is economically advanced, even becoming post-industrial; or whether at an earlier stage, such as Western China, there are both significant challenges and opportunities for environment and development. Another reality check is that it will take insight and effort on the part of those cooperating with China internationally to keep a steady and

productive relationship that optimizes outcomes for all sides. Otherwise, it is possible that the shift to green economy and development could stall. That would be most unfortunate whether the impacts are in China or in other countries.

4.2 Today's regional development strategy does not guarantee sustainable development within or among regions.

Certainly over the past 15 to 20 years there has been a shift towards a more comprehensive approach to regional development policy and planning. The four main regions have benefitted differentially, yet all have experienced trade-offs between environmental quality and economic growth, and with different levels of natural, human and social capital as a result. The richer areas of Eastern China have experienced significant declines in air and water quality, but now have the management capacity, including well-trained people, technical and financial resources, to deal with these and even the most difficult environmental protection problems in the coming years. Other areas, especially in Central and Western Regions, are not as well equipped to deal with the environmental stresses associated with high growth rates. Some areas are experiencing the double-digit economic growth rates common until recently in Eastern China provinces. However these other regions face the possibility of pollution spreading and intensifying from inward migration of heavy industry; impacts of mineral resource development; and the effects of rising market demand for animal protein on grasslands and water quality.

Regional growth places emphasis on transportation and infrastructure development. Some decisions are on track in relation to efficiency of energy use as well as opening opportunities for implementing renewable energy, for addressing poverty, and for ensuring that basic environmental infrastructure (water and sewage, solid waste disposal, protection against natural hazards) is in place throughout China. All these investments often have major environmental impacts, for example, from dams, and water diversion projects, and the effects of highways and pipelines on ecosystems and biodiversity. Indeed, new corridors transform landscapes on a massive scale. The cumulative environmental impacts of transportation and infrastructure are only beginning to be well understood in some of the larger parts of the country, especially in Western, and inter-regional effects.

Although China has experimented extensively with water basin planning and management, marine and coastal planning, and, more recently, with regional strategies for air pollution, these efforts have not met with necessary levels of success. Often there are collisions of objectives among sub-regions, or between regions.

Mechanisms such as eco-compensation for protection of ecological services have taken hold. However no national system is in place. Some problems such as smog have become regional issues where no single city or industrial area can control the problem, since airsheds are polluted from multiple sources over extensive areas. This same problem exists for non-point agricultural pollution, and of course, marine areas.

Unless regional development strategy places greater emphasis on green development throughout all parts of China, and on inter-regional issues, it will be difficult to achieve sustainable development either regionally or nationally. The regions are so interlocked that even if there are improvements in part of the country, these achievements will be endangered if conditions decline elsewhere. This has already occurred in relation to air and water quality, and possibly in soil pollution problems. The difficulty to be faced is how to fairly and effectively address needs for differentiated approaches while still ensuring that the nation as a whole benefits.

4.3 Mechanisms for differentiated regional green development are still at an elementary stage.

It is appropriate for the goals of green development to vary between regions; and, within each of the four major regions to vary among the different provinces, autonomous regions and municipalities. This point is often explicitly recognized, for example by setting out differences in the environmental targets to be reached, and in relation to actions such as outmigration from areas that need strict ecological protection, or in the funding allocated to reforestation or grassland programs for protecting ecological services. The best efforts deserve considerable praise as successful efforts to accomplish both environmental and social economic development objectives. However, there is considerable confusion, sometimes with objectives working at cross-purposes and lack of capacity and understanding for newly introduced management concepts.

Confusion exists over national vs. regional pollution standards and practices. Although it is not surprising that differing levels of pollution control are a reality in China today, there must be some agreement about the future. The issue is whether major pollution emitting centres should be treated more or less alike, and cleaned up to similar standards and over similar time periods. Or should there be more lax standards in areas of lower population, or at an earlier stage of development?

Western China development is being based in part on policies related to Eastern China's past experience and primarily based on stimulating economic growth through

increased investment. This strategy, which can rapidly raise growth rates to levels above 10 to 12%, led to high energy and high pollution outcomes and the same could happen in Western China and perhaps in other areas: ‘pollute first, clean-up later’. Certainly there is some hope that the worst will be prevented, but the capacity to deal with rapid development is limited, and there is limited control in dealing with the large number of industrial shifts taking place.

Incentives for environmental improvement are inadequate in the taxation system and in regulatory measures such as fines for pollution control. Enterprises have limited incentive to spend on environmental controls as long as there limited financial sanctions, or if they are not encouraged through sharing of costs for improvements. Competition between regions and provinces to secure industrial development is severe and cutting environmental corners by accepting less than best practices in order to secure industry growth is an issue. Green tax reform has been slow.

R&D investment in green technologies and capacity building of innovation skills is limited in some areas. If the right combination of human resources and access to green technology cannot be put in place, there is limited potential for green development. This places some sub-regions at a severe disadvantage, as cities and resource-dependent communities in rural China have discovered.

Main functional zoning is not developed well enough to be a reliable tool for sustainable and green development. China’s laudable effort to define zones according to sustainable land and water use based on ecological conditions, existing uses and special conditions has been underway for a half decade. Yet main functional zoning is by no means a success at this point. The scale is too coarse (i.e., not operative at very local levels), and the designations are poorly understood locally. The functional zones and their boundaries are defined without full participation of affected people and resource users. They may become locally contentious. Thus what could be a most useful means to resolve land and water user conflicts and marine resource overlaps must be considerably upgraded to achieve optimal results. This will take a decade or more based on experience in other countries, and it is urgent to accelerate progress.

There is no comprehensive, unified eco-compensation system in China, although substantial financial support is expended each year on such compensation. China has a well-established and quite extensive set of initiatives to provide longer-term protection for watersheds, wetlands, and other areas that provide ecological services.

Most of the payments originate from central government, or upstream subnational jurisdictions. Those benefitting most from the services (e.g., cities on rivers downstream) generally pay little. Furthermore, at this point, there is limited assessment of how to achieve best value for expenditure. Eco-compensation is a vital part of both national and regional green development strategies and likely could produce much greater benefits at lower cost, with more consideration of having beneficiary regions directly share in the costs. Better outcomes might then occur more quickly.

4.4 Industrializing and post-industrialization processes require separate but linked green development approaches.

China is currently paying much attention to structural adjustment of its heavy industry in order to reduce the extent of overinvestment and environmental damage, and to provide a quicker path to more balanced growth, including expansion of the service sector. As the service sector's contribution rises to levels of 50% or greater, there should be positive effects on environmental conditions in the Eastern Region. The assumption would seem reasonable, but the balance is precarious since there is redistribution of heavy industry especially to Central and Western Regions.

Green development for industry must be multi-pronged, taking into account cleaner production based on lower pollution intensity, ultra-energy efficient and non-polluting new production processes, and substitution of processes and products. Such industrial ecology is becoming well tested in China, but still not widely enough applied. Consolidation into large, modern operations combined with forced closure of inefficient producers occurs frequently and this trend will continue.

Soon industrialization will see quite separate types of situations. One is in the newly industrializing locations such as Western China and parts of Central China, where there may be good intentions but limited capacities to move directly to a desired high level of clean production and advanced technologies. The second is the post-industrialization situation in areas such as the Northeast and East, but also in the other regions, where dirty industries have moved out, leaving a legacy of brownfields that require expensive remediation. The post-industrialization areas also face the emergence of new service-oriented facilities and activities that have their own new types of environmental problems such as the high energy use of major computer data storage facilities, the demands on the financial sector for improved environmental monitoring of their loans and other activities, and the tourism sector with its impacts on biodiversity and fragile ecosystems. Thus separate but linked pathways of green

development are needed to make regional green development supportive of national needs.

For greening of older industrialized areas that remain in place, entrance requirements need to be high so that best practices are favored. It will be necessary to have high standards put in place throughout China—so that simply dismantling old high polluting, high energy use industrial plants and re-assembling them in new locations is not an option. Mechanisms are needed for sharing experience based on success stories where production facilities have been environmentally upgraded cost-effectively. Much of this successful experience can be gleaned from locations in the Eastern Region.

For some of the service industries that increasingly will be found throughout China, there are challenges that include green building design, design and operation of new business campuses, and light industry or high-tech green industrial parks, and the development of green relationships, whether for investments, market supply chains, or customer/client oriented certification or other programs that demonstrate commitment to green development and green products.

At the heart of all these approaches is corporate social responsibility, covering the industry's license to operate in a community and its profitability based on meeting—in a transparent way—specific environment and green development goals.

4.5 Green development coordination and integrated management is limited in effectiveness.

Coordination mechanisms are insufficient at local-provincial, regional and within central government levels. This is a general problem concerning development within China, but it is perhaps more severe in the case of environment and green development concerns. The reason why is that many such concerns are “spill-over” problems, or externalities. In addition, most of China's rich resource bases are now being exploited in a single-minded way to meet very specific objectives that demand a more or less constant increase in production. The Bohai Sea is an example in the marine environment, where more is being demanded from fisheries, aquaculture, offshore oil and gas, tourism, and from shoreline development that includes extensive infill and loss of wetlands. There is no effective integrated planning and management; nor is there a robust emergency response system. Thus when an oil spill occurs, the economic cost is high and ecological damage excessive. Similarly, the pollution over China's cities now requires an integrated management approach since the primary pollutants from various sources and locations form into secondary pollutants such as

PM_{2.5} small particles that spread widely and form a costly regional problem that is hard to solve.

The success of past efforts for environmental protection has been based largely on meeting defined single targets, whether for reforestation (% of forest cover) or pollution reduction and energy efficiency (reduction of SO₂, energy intensity reduction). The problem is that these targets do not necessarily translate directly into improvements in ambient environmental conditions, or to more healthy ecosystems, or even to reduced environmental risks. This a dilemma that will be repeatedly encountered in the complex situation of regional green development in China, where there already exists a high level of demand on the part of citizens for actual environmental improvements. The argument for effective integrated assessment and management includes improved capacity for monitoring for improvements in environmental quality progress, plus human and ecosystem health. The recently-created MEP regional offices have demonstrated the value of independent monitoring, and should be strengthened in order to carry out their mission even more effectively.

Given that existing regulation and institutional arrangements are not working to solve these and other such problems such as integrated water basin management, there clearly must be a move to new ones. There are numerous models to draw on from international experience, for example Los Angeles on air pollution, Murray Darling river basin management in Australia, the Barents Sea integrated management and the Black Sea Commission in Europe. China may learn from these and other approaches, but it will need to define approaches unique for its own complex situation. Two great problems need to be addressed: (1) overlapping institutional responsibilities without clear lines of authority; and (2) limited monitoring and enforcement abilities, with many dispute resolution needs.

More broadly, there is no clearly defined green development authority at any level of government in China; nor is there a full understanding of how far-reaching an integrated planning and management approach to green development might have to become. Green development certainly requires new investment strategies, new indicators of progress, improved sharing of information, regulatory streamlining, clearer lines of accountability, and capacity development. It may be valuable to consider consolidation of implementation authority so that resource and environmental management may be dealt with on a more holistic basis, and in the context of regional green development.

4.6 Lack of a clear long-term vision and strategy to guide national and regional action for green development in China.

The 1994 China Agenda 21 document provided a comprehensive sustainable development outline appropriate for China's needs at that time. It was to a considerable extent outstripped by the high economic growth rates of the past 15 years, leading to the situation of today's "unbalanced, uncoordinated and unsustainable development." While many of China's existing policies are suitable for a national green development strategy, they are still pieces that do not add up to a whole, and there is no nationally-adopted strategy. A vision and strategy at least to 2030 are needed, and for some important elements such as Low Carbon Economy, the need extends well beyond that time frame. A strategy for Green Development needs to consider the optimal balance and utilization of natural, economic, social and human capitals to bring about and sustain green regional development and prosperity. In addition there must be political leadership and good governance at a national level without which any strategy is likely to fail. The timing for defining and adopting a Green Development Strategy is excellent, given that, at the 18th CPC Congress in November 2012, Ecological Civilization/Progress was elevated to the same level as Politics, Economy, Society and Culture—all main drivers of change for the whole Chinese society.

Citizens should play a responsible & helpful role in green development planning and implementation, yet the opportunities to do so are largely beyond their reach at present. Four examples of how this situation could be improved include:

- Expanding opportunities for more substantive direct citizen input to environmental assessments and other planning processes; with government providing full disclosure on green development concerns including topics such as toxic waste inventory and disclosure, and regular monitoring of environmental problems.
- Fostering green job opportunities within regions, e.g., to support low carbon economy, circular economy, etc. This may require financial inputs through mechanisms such as eco-compensation.
- Putting in place co-management arrangements with local community groups in Western China & elsewhere for ecological construction and nature protection including ecosystem and biodiversity conservation.
- Placing greater emphasis on environmental education, community improvement initiatives and other means to promote an understanding and capacity for green development.

Green consumption should be part of the Green Development vision and strategy.

This element should be tied to both consumers and producers. If green choices are unavailable, poorly understood, not offered at a reasonable price point, or uncompetitive for other reasons they will not be purchased. Both goods and services are of concern, especially regarding personal transportation, government procurement, and in market supply chains. It is observed that a significant number of urban dwellers in China are moving towards western consumption levels either at home or in their office workplaces, often in western-styled high energy consuming buildings. While a small number of office buildings in China are built to LEED standards, most are not.

China's cities are essential partners for Green Development and yet in the rush to build quickly and cheaply this potential is not being fully exploited. There is no overall Green Development Strategy for China's urban development, although there are many interesting initiatives unfolding. The concept of eco-cities, pioneered in other countries but also found in China is one starting point. Another is the enthusiastic reception of many Chinese cities to Low Carbon Economy, as highlighted at the Shanghai Expo.

China's urban development allows for a variety of approaches to take into account the uniqueness of setting, cultural, stage of development, and other characteristics. Also, there is the opportunity to build specific innovations centred around sustainable technologies, for example related to green automobile development and production, and a focus on high quality of urban living through outstanding urban planning and design. Gateway cities to areas of outstanding natural beauty can develop a tourist based service economy. It is quite likely that within the various regions of China, it is the cities that will take the lead in defining green development opportunities and pathways.

4.7 Alignment of China's Green Development with International Green Economy Trends.

Rio+20 emphasized Green Economy directions at the national level, but was not particularly strong on sub-national regional development needs. Generally, China is ahead of many other countries in terms of exploring the implications of green growth, economy and development. However it is essential for China to draw upon the relatively rich experience in other parts of the world that could hasten China's own transformative changes. Secondly, China already is in a position to market both goods and services for green development to other countries and thus turn its efforts into substantial economic gains. Third, there are important implications for China's future international cooperation, especially with transferring experience and technologies to

developing countries, and in cooperation with countries to solve problems of mutual interest such as clean energy technologies. There is a need to green China's Outward Direct Investment (ODI) and perhaps include this process in the overall Green Development Vision and Strategy.

Finally, given that Green Economy and Green Growth will be an important component of discussions in future international negotiations and dialogue, China can seek workable partnerships and other cooperation that will benefit its own regional and national development, and will contribute to better development elsewhere and globally.

5 CONCLUSIONS

Consolidation of environmental protection and management, low carbon economy, circular economy and sustainable development strategies with green growth and green economy is needed in order to provide a strategic direction for green development. In a few words: mainstreaming green development into national and regional decision-making. China's most recent elevation of *Ecological Progress* places the subject at the highest level of societal drivers. This should permit accelerated consideration of green development in future regional development efforts well into the future, especially in the critical period between now and 2030. While the CCICED studies this year provide insight into green development roadmaps for specific regions and types of problems, it is very evident that a national green development strategy strongly focused on regional development and also on China's external environment and development relationships is needed for guidance. Such a strategy would be very helpful in providing substance and practical guidance for implementing a comprehensive approach for *Ecological Progress*.

5.1 Mainstreaming regional Green Development

China has made substantial commitment in the 12th FYP to addressing regional economic imbalances and to enhancing environmental quality throughout China. These commitments will provide a substantially altered baseline condition by the start of the 13th FYP. The richer provinces will focus on pollution reduction, but it is very important that new sources of environmental degradation not be allowed to gain a foothold anywhere, as happened with nitrogen pollutants during the 11th FYP. Migration of heavy industry is already taking place on a considerable scale, but should not be at expense of the environment, for example in Western China. Significant issues of inter-regional cooperation & competition, transfer payments,

eco-compensation. Urbanization is a key matter for regionally balanced development, including regional clusters of very advanced infrastructure development and with great possibilities for mainstreaming green development. As well, rural-urban migration is one of the most significant subjects with regard to inter-regional development management, and will play an on-role on green development.

The following conclusions are useful considerations for the mainstreaming of green development:

- All regions are interdependent with regard to environmental changes and impacts, but the actual issues and the capacity of regions to deal with them are quite different and depend on many factors. Thus, while high quality of environment should be maintained throughout the nation, and the necessary standards put in place to ensure this happens, differentiated strategies are needed at regional and sub-regional levels.
- Continuous attention and guidance is needed from senior leaders at all levels to ensure that better coordination produces optimal outcomes. This coordination should be both vertical and horizontal, and between sectors. Green development requires institutional changes and considerable attention to capacity development. There is a need to improve accountability and to monitor outcomes through improved ecological knowledge and environmental quality. Green development requires good governance in order to achieve cost-effective, high quality outcomes.
- Green development has to be a longer-term planning effort with an agenda that extends until at least 2030, and increasingly demanding objectives including those of the current 12th FYP and the 13th FYP. Over time it should be possible to build more integrated green development approaches for topics such as poverty elimination and protection of ecologically fragile areas, green urban development, and rural ecological progress.
- Major investment decisions are required on the part of both government and enterprises to ensure effective and efficient use of funds for environmental protection and for the emerging low carbon economy. Many of these decisions involve SOEs, and also municipal levels of government. There has been much concern on how the concept of scientific development can best be applied for these decisions and in the follow-up management actions. Further improvements of environmental impact assessment, new efforts such as social risk management, and environmental audits are being discussed at present. These are promising mechanisms, but require careful consideration of how they can produce better results without further administrative confusion and coordination complexity. They also require a high level of transparency in their application.

- Laws and regulations pertaining to greening of regional development, and necessary incentive systems require further attention. Some environmental laws are outdated, and perhaps are not sufficiently robust to address emerging problems such as regional air pollution, adequate fines or other punishment for major incidents, or health and environment risks. Promotion of the rule of law includes the need for improved disclosure of environment and development information. It also means full access to courts for citizen complaints and other mechanisms that improve the capacity of citizens to monitor, comment upon, and take action for the safeguarding of their local environment, and participating in the improvement of the country's *Ecological Progress*.
- China's efforts for mainstreaming green development may be helped by improved linkages to green growth & green economy efforts elsewhere in the world, including both developing & industrialized countries

5.2 Practical priorities for Green Development

Among the many practical priorities that have been identified in the discussion on regional green development, seven stand out for special attention in all regions:

- Improved human capital in all regions through robust employment strategies, with a focus on poverty reduction, education, health, and advanced skills for value-added employment especially in the service sector.
- Improvement of the integrity of urban and rural environments and ecosystems and biodiversity management, improvement of ecological services, high quality of the built environment, regional pollution control, sustainable resource use.
- Transition to a Low Carbon Economy including sustainable energy transportation & infrastructure, application of green technologies throughout energy production and utilization in key sectors, and major shifts away from today's approach to coal use.
- Green industrialization in primary, secondary and tertiary levels of industry.
- Optimized land and water use, including river basins, marine & coastal areas, waterbasins, in urbanization and rural sustainable development.
- Sustainable consumption and a relatively small ecological footprint are essential elements of a moderately well-off society.
- Livable cities and rural communities with low levels of environmental risks.

5.3 Innovative tools for regional Green Development

A number of tools now in use within China are specifically designed for application at the regional level in addition to those of general application for environment and development these include:

- Ecologically-based Main Functional Zoning can be used for ensuring green development based on local attributes, ecological services value and fragility of ecosystems. But zoning information and the actual use of such zoning for local decisions still require considerable refinement.
- Eco-cities and eco-provinces are terms used in China, with interesting local experiments, However, the expansion of today's experimentation into full practice in every part of the country could be accelerated. The benefits and costs also require careful assessment, since showcasing can be an expensive approach of limited value.
- Eco-compensation experience in China has expanded greatly over the past decade, but is not yet a comprehensive national system. It must be considered a national system since it meets needs of both richer and poorer regions. The sources and levels of funding and the use of incentives in expenditures will be important considerations in future design and long-term application.
- Ecological construction is of great value to China, with use in restoration of damaged areas. In general this approach has seen its most significant application in rural areas of Western and Central China. However as the country addresses soil pollution and brownfield sites in the industrialized areas, and ecologically damaged marine and coastal areas in Eastern China, the experience gained in operating the forest and grassland rehabilitation efforts may be put to get use. These existing programs also require improvements, especially for grassland-dominated regions.
- Innovation clusters for green technology development & application have become important in many cities and it should be possible to harvest the results of investment in such clusters during the coming decade. The possibilities for expansion into areas and development matters of sub-regions within Western China and elsewhere will open new opportunities for innovation.
- Investment models in green development will continue to evolve. This is a matter not fully resolved by any means. The potential roles of smaller start-ups and the much larger SOEs is one area of concern. Both are important. Another is the potential of FDI into areas beyond the Eastern Region to introduce new technologies and management approaches for green development. Investment in heavy industry will likely fall off somewhat after 2020, opening new possibilities for more balanced and green development. This will accompany the interest in stimulating domestic consumption levels. However, there is no guarantee that the trend will be towards sustainable consumption. Investment can help to shape the directions taken.

5.4 New Political Opportunities

CCICED's 2012 Annual General Meeting is taking place at a time of political transition in China. It is therefore appropriate to leave the final word on development to a new political leader. In his speech at the conclusion of the 18th CPC Congress, China's Vice-President, Mr. Xi Jinping noted that:

Our people have an ardent love for life. They wish to have better education, more stable jobs, more income, greater social security, better medical and health care, improved housing conditions, and a better environment. They want their children to have sound growth, have good jobs and lead a more enjoyable life. To meet their desire for a happy life is our mission.

These wishes hopefully will be turned into reality during the coming years, and in the process, green development achieved for all parts of China. Such an outcome will be an immense contribution for the whole world's environmental state as well.

Reports of Policy Research

Policy Mechanisms toward Environmental Targets for the 12th Five-Year Plan: Strategies and Policy Studies on Medium-to-Long-Term Efforts to Reduce Pollution

Executive Summary

From the “one control, two standards”²⁵ in the 9th Five-Year Plan (FYP) to the binding pollution reduction indicators in the 11th FYP, China has pursued efforts to reduce pollution—through total emissions control, pollution prevention, risk prevention, and quality improvement—for 15 years. Pollution reduction will continue to be an important measure as the nation promotes green development and improves environmental quality over the long-run.

Based on the success of the “policies and mechanism to achieve the 11th FYP environmental targets” project, CCICED has launched a sequel project for the 12th FYP. This project analyzes the situation today and new problems, and builds a medium-to-long-term roadmap for China’s efforts to further reduce pollution during the 13th FYP and beyond. Policies put forward to achieve the 12th FYP targets include coordinated multi-pollutant emissions reduction, sector-specific and region-specific efforts to protect the environment, and economic restructuring through total emissions control.

Chapter I. Review: Assessment of Pollution Reduction under the 11th FYP

The CCICED Task Force have used methods such as logical framework analysis, traffic light analysis, regression analysis, and decomposition of factors to objectively assess work toward pollution reduction goals, the resulting benefits, and the challenges that lie ahead. The Task Force found that, generally speaking, pollution reduction efforts under the 11th FYP have been a great success, meeting and even surpassing targets. Against a backdrop of faster-than-expected economic growth, industrialization, and urbanization, this is a remarkable achievement—and a sharp contrast with results under the 10th FYP.

²⁵ “One control” refers to the control of 12 main industrial pollutants, including SO₂, industrial dust, chemical oxygen demand, mercury, and cadmium. “Two standards” means that industrial polluters must meet national or local emissions standards, while specific zones must meet national standards for air and water quality.

Thanks to the joint implementation of a responsibility system for local governments, pollution control projects, structural adjustment, and environmentally friendly economic incentives, China has avoided higher pollution levels. However, despite these significant accomplishments, the nation will need to ramp up its efforts to achieve the environmental goals in the coming years.

I. China made great efforts to pursue arduous pollution reduction tasks under the 11th FYP, and the resulting achievements are remarkable.

1. Adhering to caps on pollution when economic growth was greater than expected is a great accomplishment.

Under the 11th FYP, some measures of economic and social development related to the environment deviated from the planned scenario. GDP growth exceeded the target by 13.7 trillion Yuan. Urban population increased by 11 million. China consumed an extra 550 million tons of coal-equivalent energy. The service industry's share of GDP was 0.5 percentage point less than expected. Reductions in energy intensity fell 0.9 percentage point short of the goal.

Because of the higher than expected economic growth, the nation needed to reduce its chemical oxygen demand (COD—a measure of organic pollutants in wastewater and surface water) by 2.08 million tons, and sulfur dioxide (SO₂) by 4.93 million tons, to meet the 10 percent pollution reduction goal in the 11th FYP.

Table 1-1. Performance on environment-related targets in economic and social development under the 11th FYP

Economic growth exceeded the planned scenario under the 11th FYP, putting extra pressure on efforts to reduce overall pollution, and preventing China from reaching some resource- and energy-saving targets.

Item	Target	2005	Set Targets		Actual Performance		Difference in growth rates (percentage points)	Impact on environment
			2010	Average annual growth (%)	2010	Average annual growth (%)		
Economic growth	GDP (trillion Yuan)	18.5	26.1	7.50	39.8	11.2	+3.7	Negative
	Per capita GDP (Yuan)	14,185	19,270	6.6	29,748	10.6	+4.0	Negative
Economic structure	Proportion of service industry (%)	40.5	43.3	[3]	43	[2.5]	[-0.5]	Positive
	Proportion of R&D expenses in GDP (%)	1.3	2	[0.7]	1.75	[0.45]	[-0.25]	Positive

	Urbanization level (%)	43	47	[4]	47.5	[4.5]	[+0.5]	Negative
Population, energy and resources	Total national population (10,000)	130,756	136,000	<8	137,053	9.6% ²⁶	[+1.6] ‰	Negative
	Reduction in energy consumption per unit GDP (%)		[20]		[19.1]		[-0.9]	Positive
	Reduction in water consumption per unit of industrial value-added (%)			[30]		[36.7]	[+6.7]	Positive
	Utilization efficiency of agricultural irrigation water	0.45	0.5	[0.05]	0.5	[0.05]	0	Positive

Source: Outline of the 12th Five Year Plan for National Economic and Social Development; 2010 6th National Population Census (No.1). Data in [] are five-year totals.

By 2010, China had surpassed the emissions reduction goals in the 11th FYP, with COD discharges and SO₂ emissions declining by 12.45 percent and 14.29 percent, respectively, from 2005 levels. COD discharges dropped by 6.94 million tons and SO₂ emissions dropped by 10.44 million tons. Specifically, China reduced extra COD discharges by 5.18 million tons and SO₂ emissions by 6.80 million tons²⁷ to offset faster-than-expected economic growth (Figure 1-1).

Controlling a rapid pollution increase given economic growth, and maintaining caps on key pollutants, will be China's most important and difficult challenges in the new era.

²⁶ The GDP numbers are original prices of the year (not comparative prices), but the growth rate are calculated by comparative prices (discounted and considered inflation), therefore, they are not consistent.

²⁷ These numbers are the sums of the numbers for new emissions due to unexpected new development (pink-key) and the numbers for anticipated new emissions (brown-key).

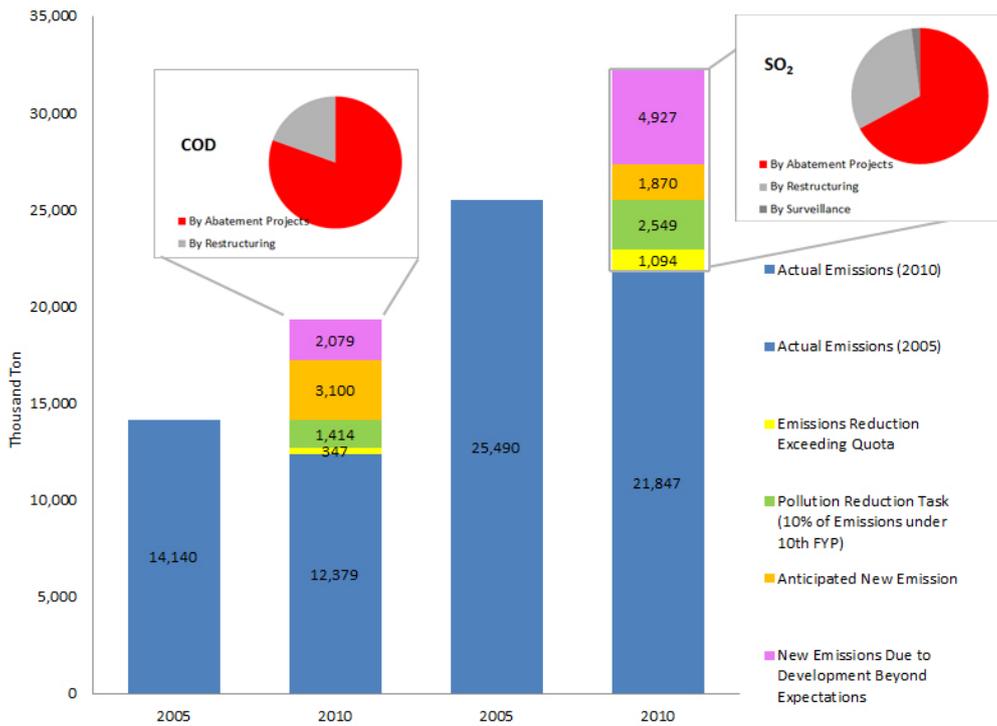


Figure 1-1. Reductions in total COD discharges and SO₂ emissions under the 11th FYP

Source: Social and economic development scenarios developed at the beginning of the 11th Five-Year Plan; MEP monitoring and appraisal data, 2007 to 2010.

2. Pollution abatement projects contributed to most reductions, and laid a solid foundation for success.

Investment in pollution reduction projects under the 11th FYP totaled around 816 billion Yuan, with construction and operational costs costing 455 billion Yuan and 361 billion Yuan, respectively. With environmental investment from all sources programmed at 2 trillion Yuan in the 11th FYP, including 166.7 billion Yuan from the central government budget—an almost threefold increase compared with the 10th FYP, the construction of key projects was guaranteed.

Construction of sewage treatment plants in cities, and desulphurization facilities for coal-fired power plants, far exceeded the original targets under the 11th FYP. By 2010, all counties in 16 provinces and municipalities, including Hebei, Henan, Hunan, and Guizhou, had set up their own sewage treatment plants. By the end of 2010, China had built a total of 2,832 urban sewage treatment facilities—an increase of

around 2,000 under the 11th FYP. Daily treatment capacity reached 125 million tons—an increase of 65.35 million tons per day from 2005.

The capacity of completed and functioning sewage treatment plants exceeded the target by 20 million tons, or 144 percent. The capacity to treat COD discharges exceeded the target by more than 1.3 million tons. Statistical analysis shows that increased investment in urban environmental infrastructure construction has played the largest role in reducing COD emissions. Sewage treatment in cities rose from 52 percent in 2005 to 77 percent in 2010.

By 2010, 578 GW of coal-fired power plants had been equipped with desulphurization facilities—an increase of 532 million kW under the 11th FYP. The share of thermal power generating units with desulphurization equipment rose from 12 percent in 2005 to 82.6 percent in 2010. The installed capacity of thermal power plants with desulphurization equipment has exceeded the planned target by 177 GW. This represents an increase of 50 percent over the original goal, or the capacity to reduce 2.9 million tons of SO₂ (Figure 1-2, Table 1-2, and Figure 1-3).

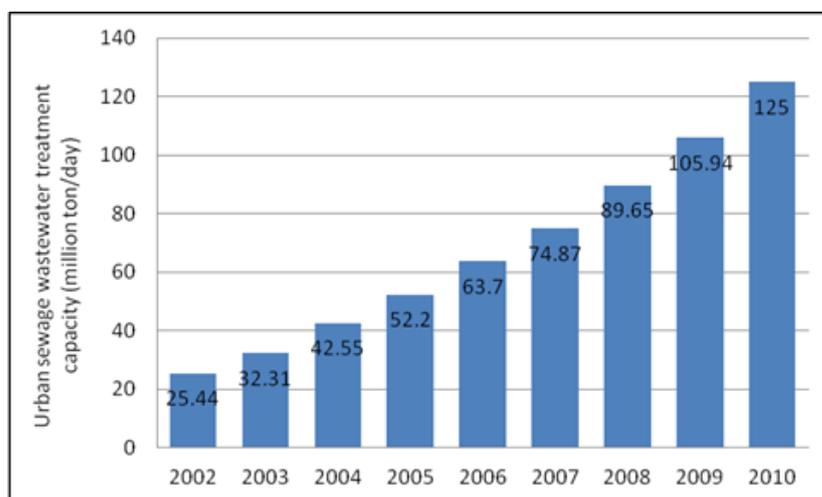


Figure 1-2. City sewage wastewater treatment capacity, 2002–2010

Source: Environmental Statistics Communique, Ministry of Environmental Protection.

Table 1-2. Construction of wastewater treatment facilities under the 11th FYP

Major Items	Targets for 11 th FYP	Actual performance under 11 th FYP
Wastewater treatment	105 million m ³ /day, including new capacity of 45 million m ³ /day (with 30.00 million tons of capacity formed)	125.35 million m ³ /day, including new capacity of 65.35 million m ³ /day
Wastewater treatment	29.6 billion m ³ /year	34.33 billion m ³ /year

volume		
COD reduction	3.00 million tons	4.00 million tons
Wastewater treatment rate	Average city/town wastewater treatment rate of 52%, with cities $\geq 70\%$ and county towns $\geq 30\%$	Average city/town wastewater treatment rate exceeded 75%, with cities reaching 76.9% and county towns reaching 44.2%
Load factor of urban wastewater treatment facilities	$\geq 70\%$	78.9%

Source: Environmental statistics communique, MEP.

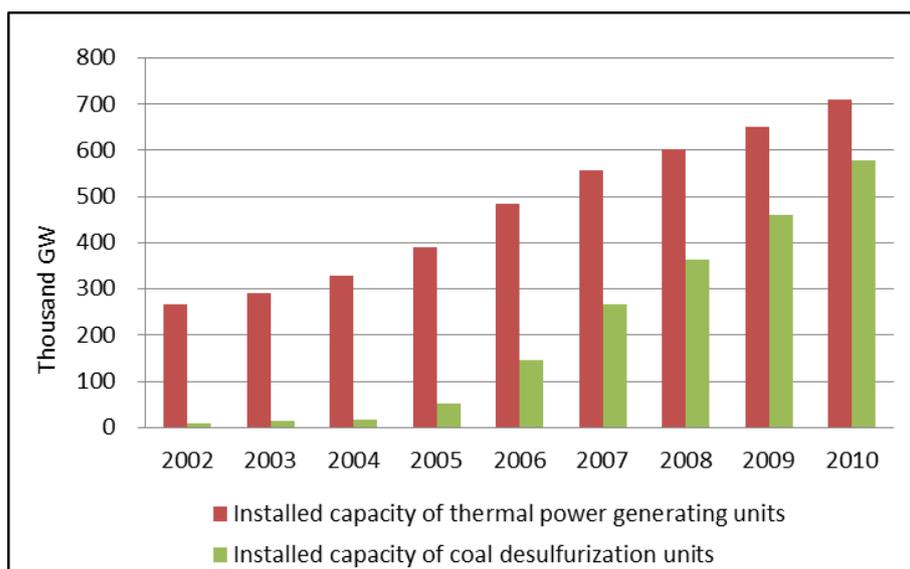


Figure 1-3. Growth in installed capacity of coal desulfurization units

Source: Power industry statistics; Environmental Statistics Communique, MEP.

The construction of pollution-treatment and emission-reduction facilities contributed most to the attainment of emissions goals under the 11th FYP. To be specific, COD reduction achieved through project construction accounted for 80.5 percent of the total COD reduction. Sewage treatment plants accounted for 58.5 percent of that share, with plants in 20 provinces and municipalities, including Beijing, Tianjin, Shanghai, Guangdong, and Chongqing, accounting for more than 50 percent of their local reduction. SO₂ reduction achieved through project construction accounted for 67.2 percent of the SO₂ reduction, with desulfurization projects for coal-fired power plants contributing 59.5 percent of that share.

Analysis of the impact of different efforts to reduce COD discharges (using a binary regression model) suggests that sewage treatment facilities in urban areas and

cleaner production were more important than other efforts in achieving this goal. However, industrial COD discharges may contain more environmentally toxic elements, and are likely to be more critical in keeping specific bodies of water clean. Determining whether to adopt centralized municipal treatment or decentralized treatment at industrial sources—or a combination of both—will be key in coming years.

Under the 11th FYP, provinces and municipalities also established 343 pollution monitoring centers, with automatic surveillance of 15,000 enterprises now under way. Supervision of pollution treatment facilities has also improved. However, given the 1.9 million industrial enterprises and tens of thousands pieces of pollution-treatment and emission-reduction equipment now operating in China, the share under surveillance is quite limited. Weak capacity in environmental management and surveillance remain acute barriers to further environmental progress.²⁸

3. Synergy between efforts to restructure industry, reduce pollution, and improve efficiency is occurring.

Reductions have decreased the COD and SO₂ pollution intensities of most industries—and the gap between industries—under the 11th FYP. In 2010, industrial COD and SO₂ pollution intensity declined by 55 percent and 50 percent, respectively, compared with 2005 levels.

Industrial restructuring has become one of the main drivers of pollution reduction. The share of thermal power generating units with installed capacity of 300 GW and above rose from 47 percent in 2005 to 71 percent in 2010. The cement industry has eliminated 370 million tons of outdated production capacity, while the steel manufacturing industry has eliminated 72 million tons. The share of new-type dry-process cement clinker rose from 39 percent to 81 percent, while the share of blast furnaces larger than 1,000 cubic meters in the iron and steel industry rose from 21 percent to 52 percent. Under the 11th FYP, small power plants with a total capacity of 0.77 GW were closed.

All this industrial restructuring reduced SO₂ emissions by 3.6 million tons, accounting for 31 percent of total SO₂ reductions. Closure of small plants reduced SO₂ emissions by 2.07 million tons, or 17.8 percent of the total.

²⁸ For example, SO₂ reductions achieved through stronger supervision account for less than 2 percent of the total reduction. COD reductions achieved through stronger supervision are normally counted as project emissions reduction.

However, despite the declining intensity of emissions, it is still higher in China than in developed countries. Generally speaking, China's development pattern—featuring high input levels, high energy consumption, and high pollution levels—has not been reversed. If the service industry's share of GDP rises by 1 percentage point, and industry's share falls by 1 percentage point, energy consumption per 10,000Yuan of GDP could decline by 1 percent. When the high-tech sector's share of GDP increases by 1 percent and the share of high-energy-intensity sectors declines by 1 percent, energy intensity per 10,000Yuan of GDP could also fall by 1.3 percent.

Industrial restructuring is progressing slowly. From 2005 to 2010, the share of heavy industry in total industrial output increased from 68.1 percent to 70.9 percent. The share of tertiary industry increased only by 2.5 percentage points—less than expected.

The challenge is that economic policies intended to spur growth also stimulate “dual highs”—high-energy-consuming and high-pollution sectors. Industrial restructuring in China has also mainly relied on administrative measures, which may only have short-term, periodic, and reversible effects. Some industrial policies lack a long-term framework, with measures that can be implemented progressively. The randomness of some policies, the cost of economic restructuring, and sunk costs are impediments to further structural adjustment.

4. China has put in place a package of policies to reduce discharges and emissions of pollutants, including economic incentives such as a desulphurization electricity price.

Under the 11th FYP, China established a series of economic incentives that promote energy conservation and emissions reduction, including pricing and fiscal and tax measures. It is fair to say that a policy framework for environmental improvement is emerging.

In the power sector, a subsidy of 1.5 cents per kWh was applied to electricity generated by coal-fired power plants that operate desulphurization equipment. A "green" electricity dispatching system was adopted. A cap on total emissions was introduced to the entire sector. Those sectoral policies and measures meant that the nation reached its target for reducing SO₂ emissions one year ahead of schedule. In fact, the power industry accounted for 79 percent of the total reduction in SO₂ emissions.

However, to attain the reductions required in future years, efforts to control SO₂ and other pollutants will have to move beyond focusing exclusively on large-scale sources such as power plants. The nation needs to develop and support comprehensive, long-term, forward-looking policies for conserving energy and reducing emissions. China also needs to pay much more attention to designing and implementing policies that promote the most cost-effective reductions.

5. A strengthening of the accountability and performance of local governments was the most significant advance in environmental protection under the 11th FYP.

Under the 11th FYP, all provinces assigned environmental goals and tasks to local governments and enterprises with clearly defined responsibilities, and gave them enough time to respond. The central and provincial governments complemented that effort with measures such as check and verification, regional restrictions on approval for projects that did not meet environmental standards, and the use of environmental and energy targets in evaluating local officials. This was the first time that local governments had fully shouldered responsibility for environment quality, and that shift will exert a profound influence on environment protection in the future.

The Ministry of Environmental Protection (MEP) suspended the approval of construction projects in six cities²⁹ and four corporate groups because they did not comply with environmental regulations. MEP also ordered 50 power plants and 44 urban sewage treatment plants to meet pollution targets within specific timeframes. Meanwhile the State Council commended Shandong, Jiangsu, and six other provinces and municipalities for their efforts to reduce discharges and emissions.

Some localities established positions such as “River Chief” system and “River Section Chief” system,³⁰ and “double 30”³¹ to broaden accountability beyond local officials and target specific environmental problem areas. City and county leaders in charge of environment protection in Shandong, Hebei, and other provinces had their

²⁹ Yingtan in Jiangxi, Sanya in Hainan, Hechi in Guangxi, Yuxi in Yunnan, Shuangyashan in Heilongjiang, and Wenzhou in Zhejiang.

³⁰ “River Chief” and “River Section Chief” are accountability mechanisms under which the local government chief is held responsible for the river water quality within his administrative area. The system helps facilitate the coordination among different departments in water management.

³¹ Under this plan, participating provinces evaluate 30 key counties (cities or districts) and 30 key enterprises on energy and pollution reduction goals, implementation measures, improvements in environmental quality, and public satisfaction.

poor performance recorded in their personnel dossiers, or were dismissed from office for not attaining annual targets for reducing emissions.

A dozen provinces created cross-municipality mechanisms for assessing water body section performance and determining compensation for environmental incidents. On the other hand, emissions reductions under the 11th FYP stemmed mainly from government action and compulsory measures. China still lacks a framework for concerted action by government, enterprises, and society.

6. The State Council implemented most of a work plan identifying practical steps for achieving pollution reduction targets.

The Comprehensive Work Plan for Energy Conservation and Emissions Reduction issued by the State Council under the 11th FYP made the goal of curbing the release of major pollutants by 10 percent more practical. The Work Plan called for reducing emissions through restructuring, major projects, and better management. It also included 12 major measures, such as curbing the rapid growth of energy-intensive and heavy-polluting industries. Finally, the plan included 62 policy requirements, such as adding progress in energy conservation and emissions reduction to approaches to evaluating local economic and social development.

The Task Force used a qualitative approach (the traffic light method³²) to analyze progress on these fronts. We concluded that overall implementation of the policy requirements was satisfactory, and helped China achieve the goals of the Work Plan.

Specifically, the nation strictly implemented 38 requirements—recorded as a green light. The nation roughly implemented several other requirements, such as surveillance and management of equipment, budget guarantees, improvements in operating capability, and shifts in credit, insurance, and taxes to promote environmental goals—recorded as a yellow light. Finally, the nation did not fulfill 8 requirements in the Work Plan, such as curbing excessive growth of pollutants in energy-intensive and heavy-polluted industries—recorded as a red light.

7. Achieving targets for reducing emissions under the 11th FYP produced other environmental and economic benefits.

³² This qualitative method assigns red to projects that failed or have not been implemented, yellow to those that have shown some success but need more work, and green to those that have achieved what was intended.

The reductions in emissions and discharges of pollutants achieved under the 11th FYP improved China's overall environmental quality. In 2010, the average Permanganate Index—a measure of organic pollution of surface water—at 759 state-controlled monitoring stations was 31.9 percent lower than in 2005 (Figure 1-4). Environmental quality in some key river basins has improved remarkably.

Because of declines in SO₂ emissions, the share of total land area affected by acid rain dropped by 1.3 percentage points. Average SO₂ intensity in key cities targeted for environmental protection declined by 26.3 percentage points in 2010 compared with 2005 (Figure 1-5). Using satellite surveillance data, the U.S. Environmental Protection Agency confirmed that atmospheric SO₂ in China has been dropping since 2007.

However, determining whether the nation has made enough progress to protect sensitive ecosystems and human health in acid rain hot spots will require further study. Nitrogen oxides have also become a more important factor in acid rain, and China needs to evaluate and reduce those emissions.

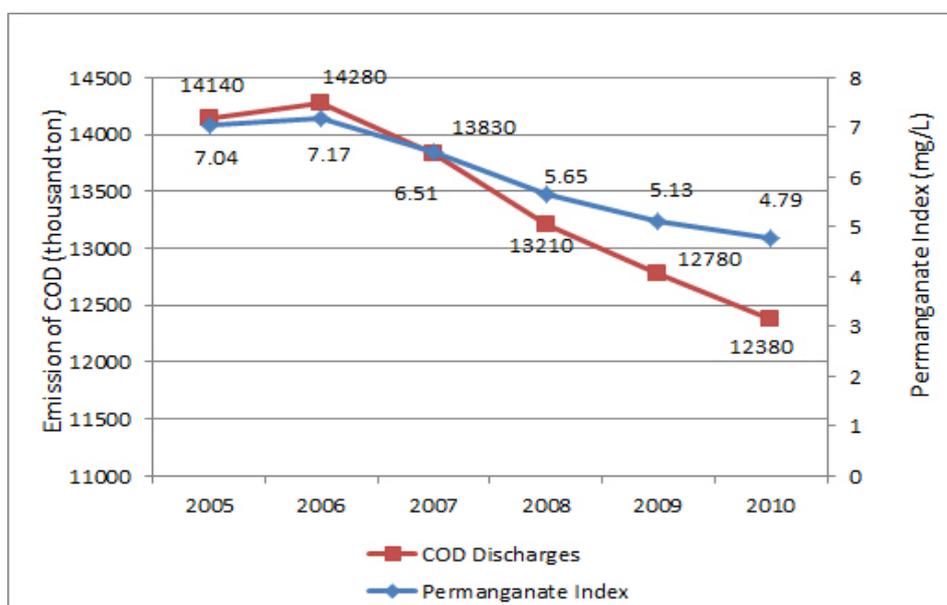


Figure 1-4. Changes in COD discharges and the Permanganate Index for surface water under the 11th FYP

Source: Environmental Statistics Communique, MEP; National Water Environmental Monitoring

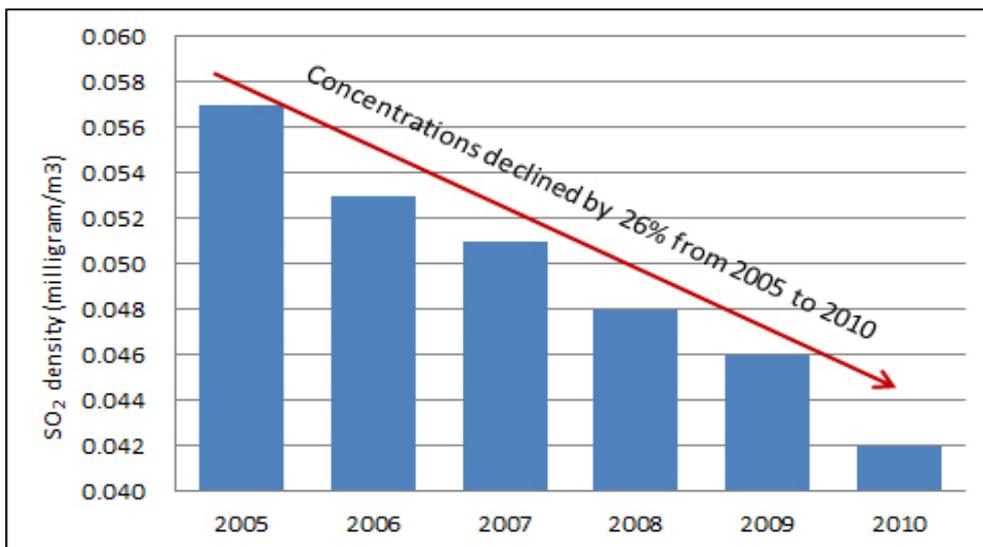


Figure 1-5. SO₂ concentrations in key cities targeted for environmental protection under the 11th FYP

Source: Environmental Statistics Communique, MEP.

Cost-benefit analysis by the Task Force shows that efforts to reduce pollution under the 11th FYP were productive. That analysis included investments in urban infrastructure such as sewerage, gas, and centralized heating; investments in systems for treating industrial pollutants, such as wastewater and air treatment systems, and in environmental facilities for “three simultaneous”³³ construction projects; the costs of operating industrial and municipal wastewater treatment facilities; and the costs of running industrial air treatment facilities.

We estimated the benefits of reducing pollution by calculating the costs of environmental degradation, including the impact on the health of urban and rural residents, the cost of treating industrial wastewater and water for human use, and agricultural losses. Specifically, the cost-benefit ratio of efforts to reduce COD discharges was 1:6.60, and that of efforts to reduce SO₂ emissions was 1:2.00 (excluding health damages caused by air pollution to urban dwellers). The overall cost-benefit ratio for pollution reduction was 1:4.94.

China greatly expanded the capacity of environmental protection institutions, and the scope and depth of supporting work, under the 11th FYP. For example, the nation upgraded the State Environmental Protection Administration into the Ministry of Environmental Protection, and made comprehensive decision making on

³³ This refers to projects that must incorporate pollution control into design, construction, and operation.

environmental protection a high priority in the context of economic and social development.

MEP's decision-making capacity has been substantially strengthened. The Chinese society has become much more aware of the importance of environmental protection, and fundamental changes have taken place in both understanding and practice. However, the role of local offices in comprehensive environmental decision making still needs strengthening.

The Bottom Line

Under the 11th FYP, China achieved emission reductions that normally occur during a later stage of industrialization. The efforts used to reach this goal helped the nation begin to restructure its economy and transform its growth pattern.

Yet some work that occurred under the 11th FYP deserves further study and action. For example, overreliance on construction of pollution abatement projects is a very limited approach to reducing emissions. Efforts to control a single pollutant increase the cost and lower the efficiency of these projects. Project quality, investment performance, and operational efficiency urgently need to be improved.

The role of economic restructuring and technological change in achieving emissions reduction needs to be strengthened. Synergies between energy and environmental targets need to be clearly articulated. The by-products of pollution abatement—gypsum from desulphurization equipment, and sewage sludge—need systematic treatment.

China has not fully implemented market-based policies essential for spurring innovation. Trade policies in some industries conflict with policies designed to reduce emissions. And long-term environmental protection mechanisms still need to be established.

Chapter II. Prospects: Transitional Changes Facing China's Economy, Society, and Environment

Most of the environmental problems China faces stem from the acceleration of industrialization and urbanization. A comprehensive analysis indicates that China would complete its industrialization around 2020. By then, the service sector's share of the economy will exceed that of the industrial sector. Increases in the rate of

resource and energy use will slow down. All these phenomena will give China new opportunities to control pollution.

The nation will be able to tackle conventional environmental problems more effectively, even as the public demands more environmental protection. New environmental problems will intertwine with old ones. All these challenges will require in-depth study and response.

I. China's economic development will remain in transition for an extended period of time.

1. China has entered the middle and later stages of industrialization.

China entered the middle stage of industrialization in the mid-1990s. By 2011, per capita GDP had reached 36,774 Yuan (USD 5,432), and 51.3 percent of the population lived in urban areas. Agriculture, industry, and services accounted for 10 percent, 47 percent, 43 percent of economic output, respectively, and heavy industry accounted for about 70 percent of industrial value-added.

In general, China has developed into an upper-middle-income country in the middle and later stages of industrialization. Although not a fully modernized industrial country, China's economic growth has stabilized.

2. China's economic development has new features.

In the past 30 years, China's economy enjoyed continuous and rapid development. China has become the world's second-largest economy, its largest exporter, and its largest manufacturer.

China is about to transition into medium-speed development—as Japan, South Korea, France, Italy, Sweden, Switzerland, Spain, Portugal and other countries did during industrialization and economic recovery. The Chinese economy has slowed for six continuous quarters since the fourth quarter of 2010, and the annual growth rate has fallen below 8%.

So far, China has relied heavily on investment and export to spur economic growth. However, this development mode is changing. Domestic consumption has seen continuous high growth (Figure 2-1), which may jump-start consumption-driven

economic growth. These market demands have already begun to compensate for the withdrawal of stimulus policies.

China is also gradually losing its demographic dividend. The cost of market factors is rising. Technological advance is making a greater contribution to economic growth: the share of R&D in GDP grew from 1.32 percent in 2005 to 1.76 percent in 2010.

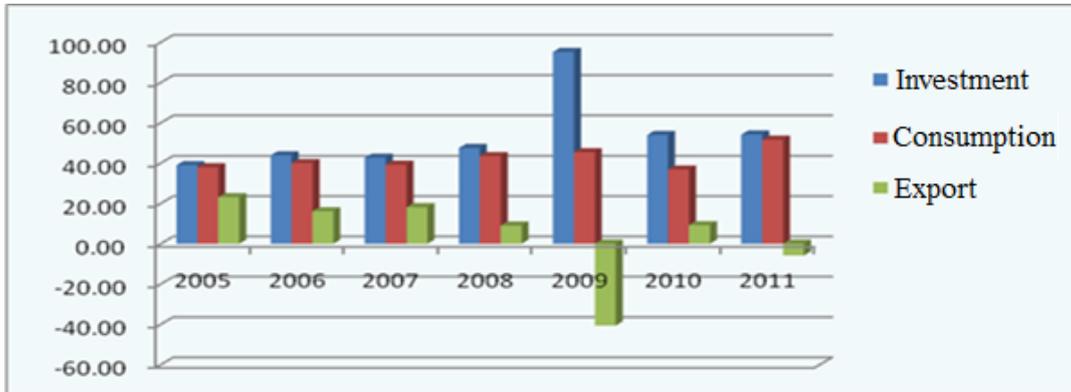


Figure 2-1. Contribution of investment, consumption, and export to GDP (%)

Source: Development and Research Center, State Council

The nation's economic structure is adjusting gradually. Industry's share of GDP fell from 47.4 percent in 2005 to 46.8 percent in 2010, while the service industry share rose from 40.5 percent to 43 percent. Although the nation did not meet its target under the 11th FYP, these shifts reflected China's economic restructuring. Still, as noted, heavy industry's share of industrial value-added remains stable at about 70 percent (Figure 2-2), posing a steep challenge to efforts to strengthen environmental protection.

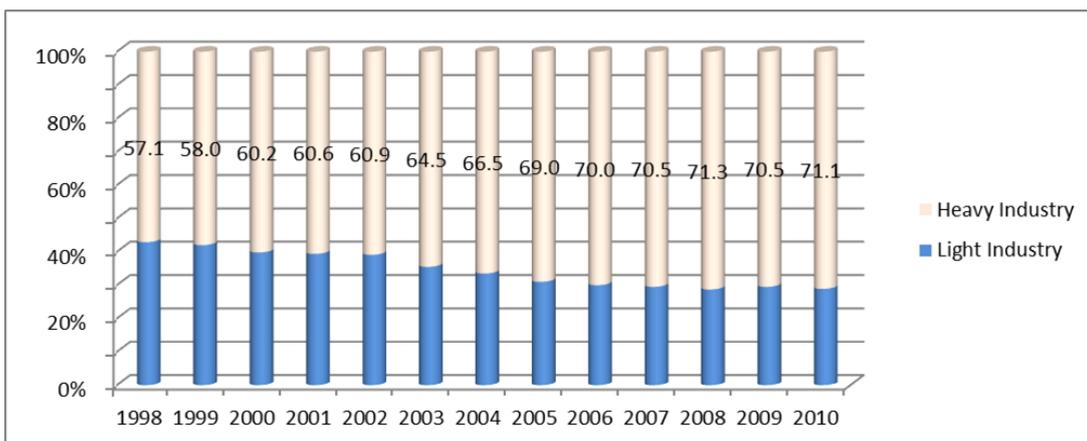


Fig. 2-2 The contribution of light and heavy industry to industrial value-added, 1998–2010

Source: calculated based on China Statistics Yearbook (1999-2011)

Given industrial and employment structures and urbanization, eastern China has entered the final stage of industrialization, with economic development slowing down. The central and western parts regions, in contrast, are still in the middle stage of industrialization.

Huge development gaps among various regions remain. In 2010, Shanghai had the highest per capita GDP, reaching USD 11,000, or RMB 74,500. Guizhou, in contrast, had the lowest per capita GDP: slightly more than USD 2,000, or RMB 13,200.

However, in general, development in central and western regions has outpaced that in the east since 2008. Continuous high growth in central and western China offset the economic slowdown in the east to some degree. Multi-regional development is occurring in China, and the focus is moving from east to west. This trend will continue.

3. China will complete industrialization and enter the post-industrialization stage around 2020.

China may join the world's high-income countries around 2020. If China maintains an economic growth rate of 7–8 percent, per capita GDP is expected to reach about USD 11,000 by 2020 (taking into account factors such as the appreciation of the RMB). That would make it a high-income country by World Bank standards (Figure 2-3).

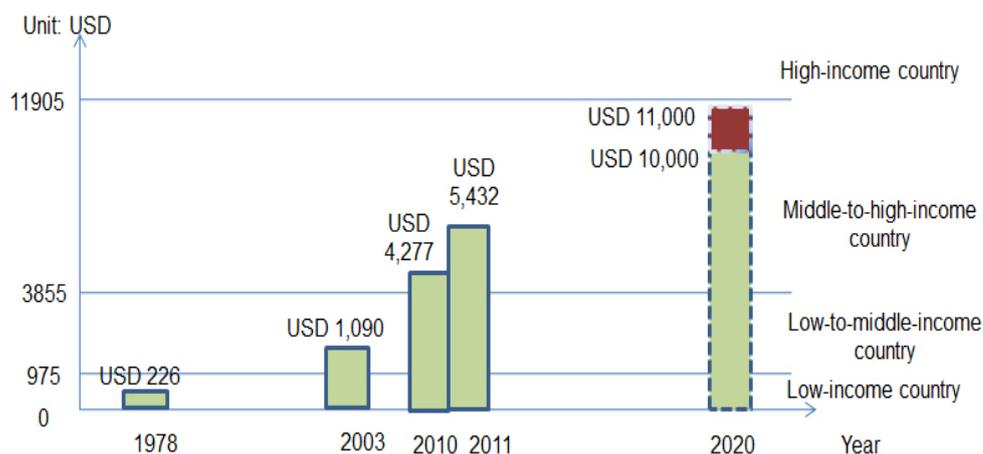


Figure 2-3. Projections for China's per capita GDP

Source: National statistics, Development and Research Center, State Council

Agricultural employment accounted for 36.7 percent of all jobs in 2010—a relatively high share. However, rural labor will continue to migrate to cities for at least 10 years.

China will also enter the post-industrialization stage around 2020, when the industrial structure (agriculture, industry, and services) is expected to have shifted to 7:43:51 from 10:47:43 in 2010 (Table 2-1). The Chinese government set a goal of building an innovative country by 2020. The World Bank predicts that China is likely to become a country that uses creativity and ideas to promote economic growth by 2030.³⁴

Table 2-1. Forecasts for China's economic structure

Year		2010	2020	2030
Economic structure	Agriculture	10	7	5
	Services	43	51	59
	Industry	47	43	36

Source: Development and Research Center, State Council.

China will complete urbanization around 2030. Countries such as the United States, France, Japan, South Korea all experienced several decades of growing urbanization, before it slowed or stabilized after reaching 70 percent. Historical

³⁴ See World Bank report "China 2030 building a modern, harmonious, and creative high-income society."

<http://www.worldbank.org/content/dam/Worldbank/document/China-2030-complete.pdf>

experience and modeling suggest that China's urbanization will reach 60 percent in 2020 and 67 percent³⁵ in 2030.

4. Trends in China's use of energy and other resources suggest slight changes in the near future.

Consumption of iron, steel, and cement dropped significantly in the United States after 1955, and in Germany and France in the mid-1970s, after those countries completed industrialization. China shows similar signs that production capacity of those commodities will peak within the next 10 years.

In 2011, China's output of crude iron and steel reached 683 million tons,³⁶ accounting for 50 percent of global output. However, demand has slowed significantly, and steel production has entered a stage of slow growth. Low-development scenarios show that China's iron and steel production will peak at 870 million tons in 2015, while normal-development scenarios predict 1.07 billion tons in 2018.

China produced 2.06 billion tons of cement in 2011, accounting for 60 percent of the world's total. The nation's cement output is expected to peak at 2.2 billion tons in 2015, and then remain stable.

In 2011, China's primary energy consumption accounted for 21.3 percent of the world's total, while the country's GDP accounted for 10 percent of the world's total. Increases in energy consumption will gradually slow after China's industrialization and urbanization are complete, and consumption of other resources per unit of economic output will fall dramatically. Energy consumption in the UK, France, and South Korea slowed after per capita GDP reached USD 12,000. Specifically, China's per capita electricity demand will increase by 6 percent annually from 2010 to 2020, and by 3 percent annually from 2020 to 2030. At that point, it will stabilize at about 7,500 kWh/year.

II. The public will demand more environmental protection.

1. Public understanding is shifting from environmental awareness to environmental rights, and environmental protection is becoming a basic demand of society in the

³⁵ This forecast is based on data from the Development and Research Center of the State Council.

³⁶ Research by the China Metallurgical Industry Planning and Research Institute indicate that crude steel production capacity has reached 800 million tons.

new era.

As China's economic and social development has reached a higher level, public awareness of environmental issues has grown. Portable instruments for environmental monitoring and rapid information dissemination have also focused public attention on the environment.

More people have started to pay attention to environmental rights as well as the benefits of a clean environment. GDP, the consumer price index, and PM_{2.5} have become the new "3 Ps" of public concern. In many areas, especially in eastern China, public demand has become a major force driving environmental protection. The result has been greater demand for improvements in environmental quality. Demands for environmental protection have even led to some incidents and emergencies.

China's goal of building a moderately prosperous society by 2020 requires the harmonious development of the economy, society, and the environment. However, the demands for a better ecological environment will become the main bottleneck in progress toward a well-off society.

2. Public expectations for a high-quality environment may be beyond existing environmental capacity building.

Public demand for environmental protection has exceeded that in developed countries when they were at the same stage of economic and social development. China's GDP now equals that of developed countries in the early 1970s. Yet China's ambient air-quality standards have reached Category III standards of the World Health Organization, while standards for PM_{2.5} are equivalent to those of the United States in 1996.

Once data on air quality are published, the public will demand that China quickly catch up to the high standards for environmental quality in other countries. The existing environmental capacity building may not be able to fulfill those public expectations for environmental protection.

III. China's environmental problems—now in a transitional stage—are not completely synchronized with the nation's stage of economic development.

1. Environmental problems that usually occur during several stages of economic

and social development coexist in China right now.

Although roughly following trends in environmental protection in developed countries, China's environmental problems do not fully match its stage of economic development. Pollution of Chinese rivers started in the late 1990s and became very serious under the 10th FYP, which was also when the heavy chemical industry enjoyed accelerated development.

Germany and the UK experienced similar challenges at similar stages. For example, pollution of the Rhine River intensified from the 1950s to the 1970s, during the massive postwar reconstruction. The oxygen content of the Thames was almost zero at the end of the 1950s, when industrialization sped up.

However, global warming emerged as a problem only in post-industrial countries such as United States, while China is facing the need to curb its greenhouse gas emissions right now. Meanwhile heavy metal and soil pollution, which should have been resolved at early and middle stages of industrialization, remains a core challenge. Problems with sewage and waste disposal, which should have been resolved at the middle stage of urbanization, also remain.

When China completes its industrialization and urbanization, environmental protection will become more complex and face new challenges. Under the combined effects of technological progress, transformation of the economic structure, and changes in consumption patterns, the nation may well avoid significant new pollution from 2020 to 2030. However, the huge amount of cumulative pollution and long-term lack of treatment will exert huge pressure for restoring air quality and the overall environment, and the climate change challenge remains.

If China does not apply stricter policy measures, mismatches between industries, resources, and ecosystems will last a long time. Complicated and novel environmental problems will intertwine even as the public demands better environmental quality. These challenges will make it more difficult for China to achieve the level of environmental quality that post-industrial and well-off society demands.

2. As environmental problems change, strategies for addressing them also need to change.

The growing prominence of regional pollution problems requires strategies for tackling them. Atmospheric haze and smog surrounding urban areas is intensifying. Some 30–50 percent of all days each year are oppressively hazy in the Yangtze River

and Pearl River deltas, as well as provinces such as Beijing, Tianjin, and Hebei.

There have been many efforts over the years to reduce water and air pollution, while not enough attention has been placed on soil and groundwater contamination. Environmental risk at the watershed level remains a serious concern. The accumulation of heavy metals and other pollutants in soil is becoming more apparent, and that means environmental risk will persist for a long time. Acute instances of heavy metal pollution, hazardous chemicals, and hazardous waste are occurring more often. The nation needs to study and address these incidents.

With the advance of pollution abatement technology, fragmented local strategies for preventing pollution have become less effective in improving regional environmental quality. Strategies for regional, integrated urban and rural prevention and control—including efforts to control all pollutants—are essential. The system for permitting industrial projects needs reform to cover a wide variety of pollutants, including greenhouse gases, solid waste, heavy metals, chemicals, and other high-toxicity and non-biodegradable pollutants in air, water, soil, and ecosystems. That approach will require a long period of multi-media control.

Approaches to controlling secondary pollutants such as $PM_{2.5}$ differ from those used to tackle traditional pollutants. $PM_{2.5}$ stems from complex chemical reactions in the atmosphere among a variety of pollutants. Curbing $PM_{2.5}$ therefore requires synchronized and precise management of chemical precursors and the reaction process. The formation of secondary pollutants in different regions requires careful study, as well as tailored strategies that consider links between production and ecology, and the use of control systems targeting multiple pollutants. Models for urban planning, construction, and management also need to consider secondary pollution.

The Bottom Line

Remarkable progress in reducing emissions and other pollutants has occurred under the 11th FYP. However, these unprecedented pollution control efforts have not led to environmental quality that satisfies the public. Doing so will require measures targeting pollution control, climate change mitigation, and improvements in environmental quality. Problems not governed by a strong emissions reduction strategy, such as lead in people's blood, "poisonous land," and non-point source pollution, require special attention so the public can recognize the nation's considerable efforts to protect the environment.

A focus on public welfare and environmental justice—with human health as a core concern—is becoming more apparent in China. As the nation enters a critical period in building a moderately prosperous society, the environment has become a central issue. China can no longer ignore inequities between the urban and rural environment. The nation needs a new human-oriented system for local pollution management, a diversified action plan targeting environmental quality, and a publicly acceptable monitoring and verification system.

Chapter III. Strategy: Designing a Mid-Term and Long-Term Roadmap

The Task Force recommends that dual controls over total emissions and quality improvement be imposed during the 13th FYP. In particular, China should coordinate programs focusing on total emissions control with caps on motor vehicle ownership, land development, and the use of energy and other resources such as water. Priority should then shift to improving environmental quality to protect human health and the ecological system under the 14th FYP (Figure 3-1 and Figure 3-2).

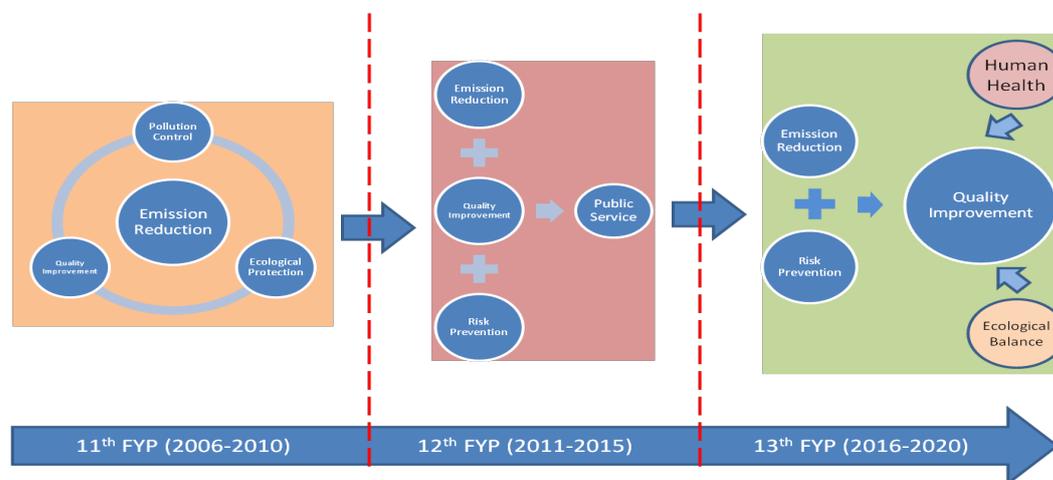


Figure 3-1. The focus of environmental protection during different stages of economic development

Note: “Public service” refers to environmental services that the government provides to society.

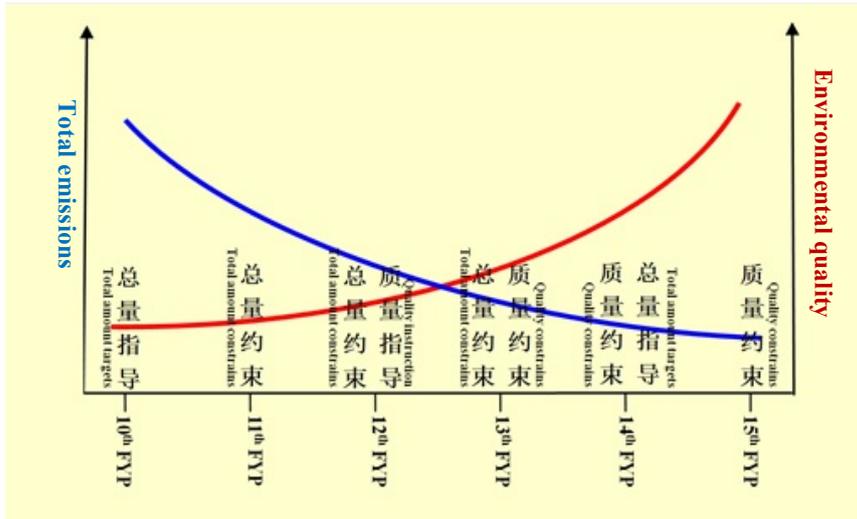


Figure 3-2. Trajectory of total emissions and environmental quality during different stages of development

I. Elevate the importance of improving environmental quality.

Strategies for managing the environment should also improve its quality. China needs to develop a mechanism driving total emissions reduction through quality control, and using the latter to force economic restructuring. Local governments should prioritize and implement efforts to improve environmental quality while fulfilling targets for reducing total emissions. Indicators for the performance of local governments should include environmental quality standards under the 13th FYP.

II. Establish a mechanism for preventing environmental risk.

China needs to establish a holistic environmental risk management system at the national level. Controlling and preventing environmental risk should then become a key goal at all levels of government.

China should strengthen its efforts to control industrial pollution, focusing on construction and operation of facilities, and waste disposal. The nation should also assess risks to human health and environmental damage, and establish a liability and compensation mechanism and codify it into law. Protection of the ecological system should guide environmental impact assessment, total emissions control, environmental treatment and restoration, and environmental quality standards.

China should clarify enterprises' responsibilities concerning environmental risk prevention, and safeguard environmental rights by using legal measures such as public interest or stakeholder litigation to compel enterprises to fulfill their duties.

China's stage of development until 2020 will be similar to that in Germany, when environmental policy moved from strict control of industrial pollution at high cost to ecological modernization at lower cost, thanks to innovations and more efficient use of resources. During this stage, China should focus on controlling growth in emissions of major pollutants and greenhouse gases, to prevent threats to food safety and drinking water, avoid health problems caused by large-scale environmental damage, reduce the risk of environmental accidents, and decouple economic development from pollution and more intensive use of energy and other resources (Figure 3-3).

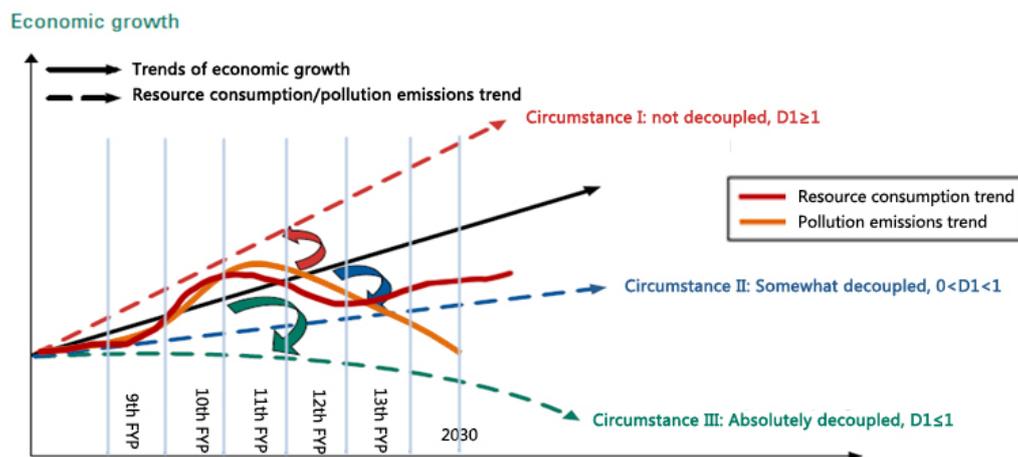


Figure 3-3. Decoupling economic development from more pollution and more intensive use of energy and other resources

Source: Prepared by the Task Force based on “Decoupling Natural Resource Use and Environmental Impacts from Economic Growth” report, page 111, OECD

Under the 13th FYP, the same 12 pollutants should be subject to total emissions control. However, the nation should strengthen efforts to control regional and industrial toxic and hazardous substances (such as heavy metals and persistent organic pollutants), volatile organic compounds (VOCs), and substances that consume oxygen in water (total nitrogen and phosphorus). China should also launch pilot projects to control non-point sources of agricultural pollutants (Figures 3-4 and 3-5; Table 3-1).

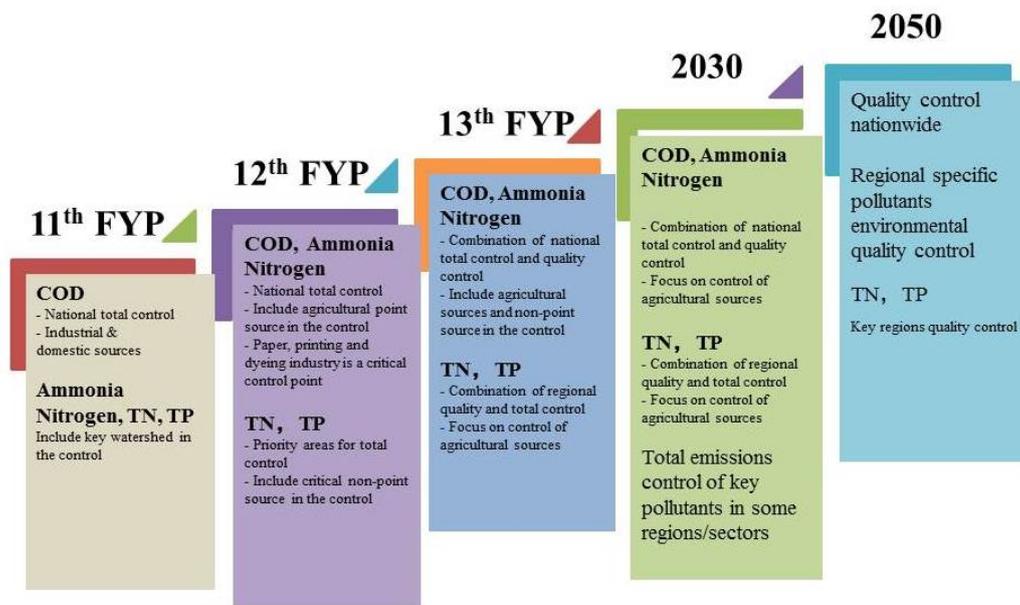


Figure 3-4. Roadmap for controlling water pollution

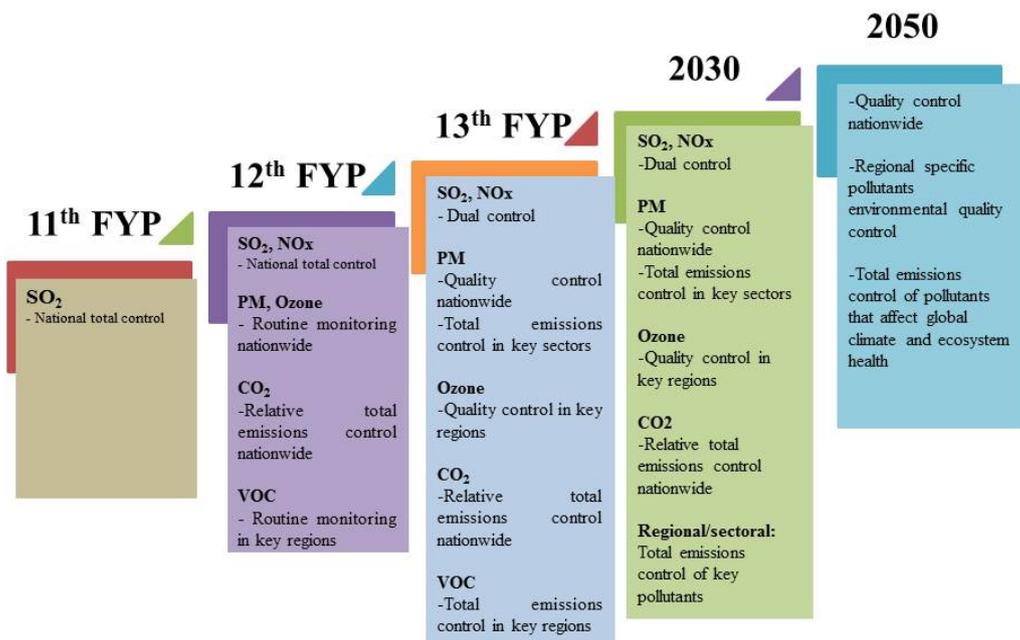


Figure 3-5. Roadmap for controlling air pollution

Table 3-1. Roadmap for mid-term and long-term pollution control and emissions reduction

	11th Five-Year Plan	12th Five-Year Plan	13th Five-Year Plan	2020–2030	2030–2050
Key points	Control of total amount as the core goal	Three major aspects & basic environmental public service	Attach equal importance to pollution control and emissions reduction, as well as quality improvement; pollution reduction and risk prevention with more consideration of the quality factor, human health, and ecosystem	Focus on quality improvement, continue to prevent and control pollution, vigorously guard against environmental risk, protect human health, and consider the balance of the ecosystem	Focus on human health, ecosystem, and environmental quality
Evaluation mechanism	Control of total amount of emissions	Total amount of emissions and quality instruction	Pay equal attention to controlling total emissions and quality control, and emphasize quality control in some areas	Quality control, total amount instruction, continue to strengthen total amount control in nonattainment areas	Quality control in different areas
Binding control factors	Control of national amounts of SO ₂ and COD; total nitrogen and phosphorus control in key areas	Control of national amounts of SO ₂ , nitrogen oxides, COD, and ammonia; control of carbon intensity; control of total amounts of heavy metals, nitrogen,	Total amount control of national sulfur dioxide, nitrogen oxides, COD, and ammonia; CO ₂ relative amount control; total amount control and emissions standards of heavy metals, nitrogen, and	National quality control as the main task, taking into account the total amount of major pollutants in some areas in some industries	Environmental quality control of pollutants with regional characteristics

		and phosphorus in key areas	phosphorus, toxic and hazardous substances, and VOC in key areas; quality control of fine particulate matter, ozone, nitrogen, and phosphorus in key areas		
Controlling fields	Industrial and city life	Industry, living, agriculture (large-scale livestock farming), and motor vehicles	Industry, living, livestock, and agricultural non-point source pollution	Agricultural non-point source pollution, industry, and living	Agricultural non-point source pollution, industry, and living
Major industries	Key industries: electricity and pulp and paper	Key industries extended to general industrial (electricity, iron and steel, pulp and paper, printing and dyeing, building materials)	Expand coverage from key industries to all industrial sectors: the expansion of electric power, iron and steel, non-ferrous smelting, building materials, chemical industry, and pulp and paper industry to the petrochemical industry, ammonia, chlor-alkali industry, phosphorus chemicals, sulfur chemical, coking industry, dye industry, non-ferrous smelting, thermoelectric industry (oil, coal), special industry (gold potassium cyanide), and mining. Oil exploitation industry is a major source of emissions of toxic and hazardous pollutants	Middle-front control and modification of production process as the focus, supplemented by structural reduction and project	The major emitters of trace, poisonous and harmful pollutants
Techniques for reducing emissions	Based on project emissions reduction, supplemented by structural emissions	Both project emissions reduction and structural emissions reduction are	Structural reduction and front-end control as the focus, supplemented by project	Middle-front control and modification of production process as the focus, supplemented by structural reduction and project	Middle-front control and modification of

	reduction	important	emissions reduction	emissions reduction	production process
Management mechanism	Government plays the main role	Government as the main player, supplemented by technological progress and market orientation	Attach equal importance to social administrative standards, and market orientation	Standard policies, social participation, market orientation as the main methods, supplemented by government administrative measures	More dependence on standards, policies, and social participation

Chapter IV. Operational Adjustments: Mechanisms and Policies for Fulfilling Environmental Targets

I. Develop action plans for improving environmental quality.

China will be under growing environmental pressure until 2020. The nation needs to formulate an action plan for improving environmental quality for the next 20 to 30 years, to ensure that progress at different stages helps achieve mid- and long-term goals. Control of major air pollutants and a cap on coal consumption will remain the core policies for China's mid- and long-term emissions reductions. Together these control policies should have a significant impact on China's greenhouse gas emissions trajectory. China currently has energy and carbon intensity targets along with a suite of regulatory programs focused on carbon reductions. Experiments with more comprehensive approaches such as carbon cap and trade are occurring throughout the country. When these results are in, the opportunity exists for a deeper integration of environmental and energy policy.

1. *Optimize the environmental management system.*

- *Shift the focus from pollution control to quality improvement.* China may take 10 to 15 years to complete this transition. After 2025, the nation will expend more effort to prevent environmental risk and protect human health and the ecological system.
- *Establish a direct link between emissions control goals and environmental quality goals.* For example, China can establish clear quality goals for watersheds, regions, and cities; set up specific criteria for allocating pollution targets; select baseline years for measuring progress; and adjust objectives on a regular basis to reflect greater understanding of the impact of pollutants on human health and ecological sustainability.
- *Identify the ecological function and environmental quality requirements for different regions, and establish regional control units.* This entails implementing watershed-control systems to focus on trans-boundary pollution; promote air quality modeling to track the transfer of pollutants transfer and their interaction, define boundary conditions, establish section and point monitoring, and define accountability.
- *Establish a system for assessing regional consumption of energy and other resources, and new pollutant emissions including the improvement of data collection and reporting of statistics at the regional level.*
- *Establish a system for verifying the quality of environmental data.* MEP

should oversee the monitoring of major rivers and cities, establish air monitoring over key watersheds and regions, conduct cross-province monitoring, and promote public oversight of environmental quality.

- *Rely on indicators of environmental quality that are tangible and publicly acceptable, and take into account human health and the ecological system.* Strengthen the indicator system to control toxic and hazardous substances with significant impact on human health and the ecosystem. Ensure that indicators include human health and ecological protection, by using designations such as "swimmable," "fishable," "visibility," and "blue sky days."
- *Implement different pollution offset policies for different regions.* As in the U.S. Clean Air Act, the ratio of new source emissions reduction versus existing emissions reduction must reach 1:1.5 for areas with extremely poor air quality. The ratio must be 1:1.1 for areas with severely poor air quality. By establishing the requirement for new sources to offset their new incremental emissions and linking the offset ratio to local ambient air quality conditions, the offset program can be used to make deeper reductions in airsheds most needing them.
- *Integrate economic and environmental policies decision making, by assessing the environmental impact of plans, development strategies, and policies; enforcing restrictions on regional approval, and moving total emissions control earlier in the production process.*
- *Develop a template for environmental planning to serve as a framework for urban and economic development.*

2. Improve policy and technological readiness.

Under the 13th FYP, China should:

- *Add environmental quality indicators and standards, including the number of people with access to clean air and a clean environment, and the length of clean rivers.*
- *Base environmental impact assessment on environmental quality rather than emissions standards.*
- *Improve the capacity of local governments to monitor environmental quality.*
- *Develop and maintain a scientific inventory of pollutants.*
- *Conduct a cost-benefit analysis of pollution reduction measures, taking into account the impact of pollution on human health, the environment, and the ecological system.*

- *Establish mechanisms for market-based environmental policies, promote eco-compensation and emissions trading, accelerate the use of environmental taxes, and internalize the costs of resource use.*

3. Strengthen public supervision.

- *Create an open government system, by publicly releasing environmental impact assessments, permits to discharge pollutants, the results of enterprise environmental monitoring, and information on environmental quality.*
- *Establish phased quality objectives and standards for different regions, and cite cities and regions that are not in compliance.* The U.S. government has given some severely polluted areas 18 years to comply with ozone limits. The key is to ensure quality improvement under feasible technological and economic conditions.
- *Report regularly on environmental quality. Governments at all levels should conduct regular regional environmental quality assessments, report the results to people's congresses at the same levels, and publicize the findings.*
- *Hold enterprises accountable by improving the permitting system, increasing penalties for violations, conducting environmental education, establishing a system for evaluating enterprise environmental credit, and promoting public-interest litigation.*
- *Include an environment audit in performance evaluations of government officials before they leave a post.*
- *Strengthen regional eco-compensation systems.*
- *Rely on people's congresses to hold the executive branch accountable for non-compliance with drinking water standards and other important indicators of environmental quality.* Findings from monitoring and assessment should be consistent with public observations.

II. Implement total emissions control at the sectoral and regional levels.

Although emissions reduction targets under the 12th FYP consider the potential of different provinces to reduce emissions and the need for industrial restructuring, links between target allocation and quality improvement are weak. Efforts to prevent pollution must shift from national control to national-regional-industrial control.

1. *Implement top-down total emissions control in industrial sectors, and curb new emissions.*

China needs to:

- *Coordinate efforts to control total emissions and production capacity in each sector*—such as iron and steel, cement, paper making, printing and dyeing, motor vehicles, and agriculture—to avoid increasing industrial emissions while decreasing regional emissions. Condition approval of new projects on pollution reduction and phase-out of old facilities.
- *Evaluate production intensity*—the use of energy and other resources per unit of output—and impose stricter standards on typical industries. For example, instead of requiring industries to meet a minimum passing standard (MPS) or average standard (such as corporate average fuel economy), impose Top Runner energy efficiency and emissions standards for certain product categories. A “Top Runner” program would periodically identify the most efficient producers by product category and set their efficiency levels as the standard for other producers to reach.
- *Cap the national use of energy (especially coal) and other resources to reduce emissions at the source.* Hold economic sectors responsible when new pollutant emissions deviate from planned scenarios and permits, or exceed the cap.

2. *Implement bottom-up regional total emissions control, and curb pollutants by regions and categories.*

- *Ensure that regions implement total emissions control policies to improve people’s lives and environmental quality.* Regions should establish maximum emissions and discharge loads, to bring discharges within the capacity of the environment to handle them. Regions that find it difficult to do so can phase in a system for achieving the targets over time. Regions with extra environmental capacity and good environmental quality can allow total pollutant discharges to increase moderately, but should ensure that pollution intensity continues to decline.
- *Ensure that regions develop implementation plans, with regular assessments and revisions, to achieve phased quality improvement.*
- *Allow different regions to pursue different approaches to environmental management.* In the eastern region, the focus should shift from total emissions control to quality improvement. In the central region, the focus should be to curb new pollution, strengthen total emissions control, and gradually improve

environmental quality. In the western region, total emissions control should occur in key resource development areas. Efforts should be made to improve environmental quality in populated areas and ecological functional areas.

In major cities such as Beijing and Shanghai, industrial pollution has dropped significantly while pollution from transportation and the activities of daily living are rising. These cities need to reduce the impact of transportation on air quality, cap vehicle ownership, adjust the urban energy infrastructure, continue incentives for low-emission vehicles coupled with restrictions on high-emission vehicles, and promote public transit and the use of clean fuel. The Yangtze River Delta, Beijing, Tianjin, Hebei, and Shandong should reduce the use of electricity and coal.

- *Ensure that urban and regional planning prioritize environmental considerations, and require protection for important ecological areas.* For grasslands, rivers, lakes, and other wetlands where pollution has already exceeded environmental capacity, regions should develop policies for evacuating residents and industry. Areas where development is forbidden or restricted should implement policies for fiscal transfer, ecological compensation, and clean development.

3. *Improve co-control of multiple pollutants.*

At the regional level, pollutants such as SO₂, NO_x, PM, and VOCs should be controlled together to resolve secondary pollution as well as problems caused by traditional pollutants, PM_{2.5}, and ozone. At the industrial and technological level, economic incentives should be used to promote pollution control at the source and during production. Standards and regulations should be established to control end products.

China also needs to:

- *Consider water, air, soil, and the overall ecosystem in managing environmental quality.*
- *Integrate management of surface water, groundwater, drinking water, wastewater treatment, and seawater.*
- *Coordinate efforts to control water use with total discharge control of major water pollutants.* Under the 12th FYP, China is studying the relationship between discharge of water pollutants and water quality throughout a watershed control area.

- *Promote coordinated reduction of water pollutants through denitrification and sludge treatment. Regulators should promote technological innovation, require that sludge be stable and non-hazardous, and conduct combined levy, supervision, and evaluation of both sewage and sludge treatment.*
- *Promote co-control of major air pollutants and CO₂. Multiple pollution control, demand side management, expanded use of natural gas, increased generation from renewables, all will act to reduce conventional and greenhouse emission loadings especially from the electric generating sector.*
- *Promote energy efficiency and clean energy to reduce emissions from the energy sector. Technologies such as coal washing and separation, low-nitrogen combustion, supercritical cogeneration, flue gas desulfurization (wet process), selective catalytic reduction, and cottrell and bag filter dust removal have coordinated effects on emissions reduction.*
- *Use recycling to control and treat pollutants in a coordinated way.*
- *Expand pollution control in livestock and poultry farming to reduce both water pollutants and greenhouse gas emissions.*
- *Ensure that the permitting system considers a broad variety of potential pollutants.*

III. Chapter V. Summary and Conclusions

This Task Force has had a wide remit and an awesome responsibility. We have had to review performance under the 11th Five Year Plan, make policy recommendations for attaining the 12th Five Year goals, and look beyond to China's environmental future. As a consequence of this relatively vast policy terrain, recommendations have been sprinkled throughout this report. In an effort to provide a further distillation of proposals, this concluding section of the report attempts a sharpened focus. The emphasis is on capacity building and institutional infrastructure as key foundation elements for the future of China's environmental management system.

I. The 11th Five Year Plan Outcomes

Meeting the 11th FYP environmental targets on SO₂ and COD is a remarkable achievement in the history of China's environmental management. Coming on the heels of the very poor performance of the 10th Five Year Plan, these results stand in even sharper relief. This report has carefully documented these achievements and the

factors involved.

From the perspective of the 10th five-year plan (2001-05), this achievement is even more remarkable. The chart below shows national SO₂ emissions data. The 10th five-year plan set a goal of reducing SO₂ emissions by 10% from 2000 levels by 2005. The actual outcome was very different: rather than decreasing by 10%, emissions increased by 30%. The 11th FYP also aimed for a 10% SO₂ reduction, but this time from the much higher 2005 baseline. Actual SO₂ reductions came in 14% below the 2005 base. What accounts for this dramatic difference in environmental performance?

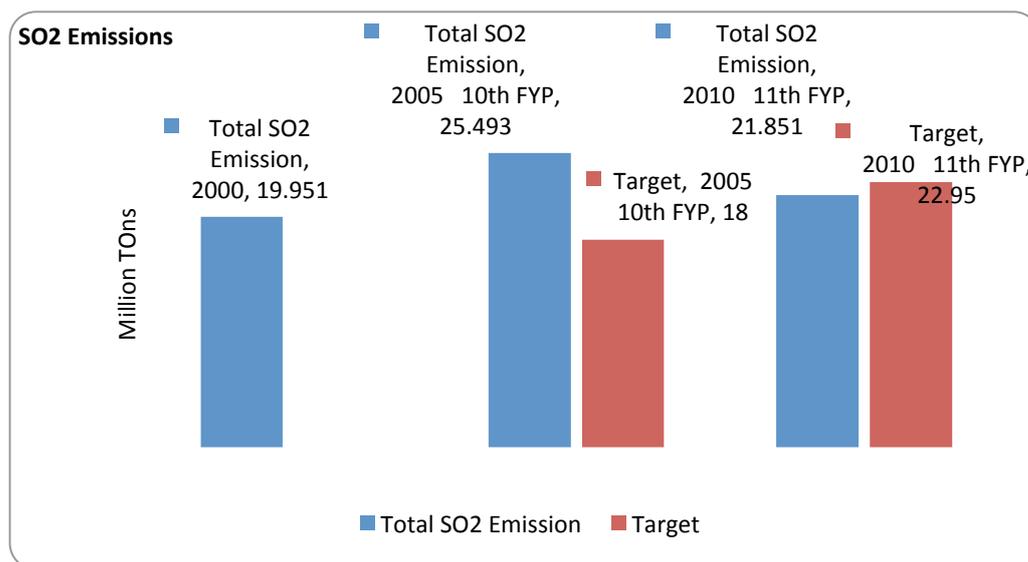


Figure 4-1 SO₂ emissions and targets

Source: emissions data are from “China’s Environmental Statistic Yearbook” 2000-2010, target data are from the 10th and 11th FYPs for Environmental protection.

The main reason for the change in performance was that the government adopted a series of coordinated programs explicitly designed to hit the mark. These included:

- The responsibility system in which both government and business leaders were held personally accountable for environmental performance.
- The requirement to compensate for emissions increase prior to issuing a permit under the Environmental Impact Assessment program and the State Council’s regional SO₂ control regulations gave expanding power companies the clear signal to shut down smaller less efficient generation units and reduce power generation at others.
- Technology subsidies for electricity generated from units with operating pollution controls.

This is a key lesson for environmental policy going forward: integrated policies

with coordinated incentives are effective in reaching environmental goals. Integrated policy tools will be even more important for the 12th FYP. The combination of strengthened penalties and flexibility will help to establish a culture of compliance which can support even more aggressive environmental targets in the future.

Missed opportunities during the 11th FYP include the failure to further strengthen incentives by adopting stricter noncompliance penalties. The artificially low financial penalty cap was removed for the water pollution control law in 2008, but similar provisions have not yet been adopted for air pollution. Energy planning and management have not been integrated. Rather, as has been noted, the extraordinary growth in thermal generating capacity from 392 GW to 700 GW made achieving the 11th FYP SO₂ reduction target even more dramatic. The missed opportunity is that energy efficiency, especially demand side management strategies, was not considered as a pollution control tool.

II. Recommendations for achieving the 12th FYP targets and beyond

The 12th Five Year Plan represents an inflection point for China in terms of environmental management. Will the protection of human health be the prime directive for Chinese environmental management? Will China maintain and build upon the success of the 11th FYP? Will energy and environment be fully integrated to correspond to the reality of the duality of their nature? These are critical questions whose answers will determine China's national and global environmental trajectory for years to come. In this concluding section of the report, we highlight some specific areas of priority attention

During 2011, the first year of the 12th FYP, SO₂, COD, and ammonia releases declined by 2.2 percentage points, 2 percentage points, and 1.52 percentage points, exceeding the annualized reduction targets by 0.7 percentage point, 0.5 percentage point, and 0.02 percentage point, respectively. However, NO_x emissions rose by 5.73 percentage points. The 12th FYP has added binding targets for ammonia and NO_x releases, and extends coverage to livestock farming and vehicles. Nevertheless, the need to further curb new pollution growth and sources is still urgent, for several reasons.

- First, projects with high energy consumption and high emissions are still growing fast, despite a drop in industrial investment. Urbanization will be accelerating with the new macroeconomic stimulus package focused on

domestic consumption and infrastructure. The lack of integration between energy management and pollution control continues to exacerbate the pollution control problem.

- Second, structural adjustment—and therefore pollution reduction—has not yet come into full force. Individual industrial sectors have significantly improved efficiency, but the economic transformation to a service based economy and rebalancing away from export-led growth is still underway.
- Third, one-third of emissions reduction projects have not made substantial progress.
- Fourth, pollution control facilities have not been operating steadily.
- Fifth, a mechanism for coordinating environmental protection is not in place. Despite the fact that MEP (formerly SEPA) was elevated to be a full ministry in 2008 and was charged with the responsibilities for the formation and enforcement of national environmental policy as well as the coordination and supervision of major environmental projects, it has not yet been given adequate policy tools, capacity or political strength to fulfill this expectation. As many environmental responsibilities are shared across agencies, different government bodies tend to compete with each other for limited resources and influence (the scattered water governance structure provides a good example; or fuel standards vs. emissions standards). MEP often finds itself in conflict with the priorities of other institutions, but lacks adequate capacity to address this problem as evidenced by the challenge of integrating energy saving and pollution reductions.

To help China to achieve its mid- and long-term environmental targets and improve its environmental quality, the Task Force proposes the following 10 specific policy recommendations:

1. Set protection of human health and ecosystems as the sole and ultimate goals of the environmental management system

It should be clearly articulated in all environmental laws, regulations, and any documents that comprise China's National Environmental Management System that the sole and ultimate goals of the environmental system are to protect public health and the ecosystems. It is critical that the goals should not be tied with the stage of China's economic development e.g., level of GDP or industrial stage.

To achieve these goals, ambient environmental quality standards should be

designed based on the scientific understanding of the pollutants' effects on human health and ecosystems, regardless of economic and technological feasibilities and costs. The goals may not be readily achievable. The point to the ambient standard setting process is to define the pollution threshold beyond which significant health damage occurs. Discharge standards on the other hand are transitional requirements that take costs and feasibility into consideration in the process of setting technology-based discharge standards for industrial sectors. However, these ambient environmental quality standards should be assessed, revised, and updated regularly (e.g., at least once every five years) so that they are in line with the latest scientific findings. Environmental monitoring standards and regulations should be developed to accurately measure ambient conditions against the quality standards.

Risk-based pollutant priority assessment is needed. A standing institutional mechanism to regularly review and evaluate the scientific understanding of the relationship between pollutant discharges and health is needed to advise MEP on the scientific understanding of risks and recommended control levels.

2. Link emissions control targets directly with achieving specific environmental goals

A clear distinction must be made between ambient standards designed to maintain pollutant concentrations at environmentally protective levels and national or regional pollution caps designed to limit total pollutant loadings and control transboundary flows. The two policies must be integrated to avoid antagonistic effects especially if market-based implementation policies are applied. For example, policies to control transboundary pollution problems such as acid rain focus on reductions over broad geographic regions. Policies such as cap and trade have been successfully applied to significantly cut SO₂ emissions, the chief precursor of acid rain. However, at the local level, SO₂ can have significant health effects. Therefore, a failure to coordinate regional and local control strategies could result in local concentration exceedances at the same time that regional caps are met. Neither ambient standards nor pollution caps linked to protecting human health and the environment may be readily achievable, but stepwise implementation policies should be established that link the interim targets and the improvement of air and water quality. It also needs to be clear that ambient standards and targets may change over time in relation to changing economic, demographic, and atmospheric conditions. Targets must be reviewed on a specified, recurring timeframe to determine what policy action is needed to meet the goals of protecting human health and the environment. It is recommended MEP organize comprehensive research on the

environmental carrying capacity of key national development zones and preferred development zones and on the assimilative capacity of river basins. The findings should inform the formation of subnational target allocation criteria. The selection of a fixed baseline year is also critical to measure the progress made in improving water and air quality. In addition, efforts should be spent in developing sectoral caps (eg. a cap for total NO_x emissions) for the major industrial source sectors such as electricity, cement, iron and steel and automobile industries.

3. Develop, maintain and update scientifically sound pollution inventories

Scientifically sound pollution inventories should be developed, maintained and updated as a foundation for understanding the scope and source of environmental problems and for determining and applying appropriate permit or regulatory controls and market mechanisms to pollution sources. One of the most powerful modern environmental management aphorisms is “you manage what you measure”.

Inventories should be established for air and water pollution sources as well as contaminated sites and sites where chemicals and hazardous substances are located as feed stocks or products. In particular, addressing hazardous and solid waste issues earlier rather than later will reduce the extremely high economic costs and serious health consequences of remediating improper disposal later. A science-based inventory will enable China to establish criteria for prioritizing and cleaning up the worst sites. Additionally, there are water and air quality consequences from failure to appropriately deal with these wastes that will impede progress on air and water total emission control.

As China expands its environmental targets to include energy intensity, carbon intensity, limits on total coal combustion, limits on the total proportion of energy use that can be derived from fossil sources, a limit on the minimum amount of electricity that must be generated from renewable energy, the statistics gathered to measure performance against these goals are also helpful in cross-checking against the reporting of more conventional pollutants such as SO₂ and NO_x. These databases should be coordinated for consistency.

4. Strengthen institutional capacity at all levels

At the central level, it is important to integrate water management authorities which are currently scattered among over 10 ministries. Since only MEP has legal enforcement authority and resources, MEP should be designated as the lead

coordinating agency for water quality for all waters including surface water, ground water, drinking water, waste water treatment and sea water etc., with support from the other ministries. MEP should be responsible for making recommendation for the harmonization of conflicting laws and regulations pertaining to water management so as to provide consistent and clear guidance to regulated industries and consumers.

At the regional level, it is recommended to expand the six MEP's Regional Environmental Supervision Centers into Regional Environmental Quality Management Centers. With more resources and expertise, these offices can focus on improving environmental quality. In addition, more effort should be spent on improving trans-boundary coordination among local governments, with a particular focus on air and river basins management.

Air basins

Air quality basins should be delineated. A special study should be launched for regional air quality management with a special focus on institutional and policy design and implementation. The lessons from the priority regional air quality management regions established by the State Council should be harvested and implemented. Air quality modeling capabilities and needs should be assessed and recommendations supporting regional air quality management made.

Alternative institutional arrangements to promote effective regional coordination on air pollution prevention and control should be tested and evaluated. For example, air quality commissions could be established for each regional air shed with representation from all local governments in the region. Local governments in the region would be required to sign a binding agreement for regional air quality assurance as has been done with major sources. The commissions would be given a separate budget and take full charge of the implementation of the agreement. Regional air quality databases and monitoring networks would have to be developed to support management and decision-making. Cities that fail to meet the Grade II national ambient air quality standard would have to formulate plans for MEP's approval to meet the air quality standards, and ensure air quality improvements on a negotiated schedule. For cities in non-compliance, MEP could withhold permit approval over new construction projects that discharge air pollutants.

River basins

Water management authorities involving water supply and water quality need to be

integrated and interagency coordination needs to be established. River basin management should be put under the authority of river basin committees. The committees should consist of government heads from all the local governments in the river basin and representatives of the national ministries with regulatory authority over water supplies and quality. Management plans and decisions should be jointly made by all the members. Each local government and its representative should be held responsible for discharges in their jurisdiction. The river basin committees should have the power to levy discharge and user fees so as to raise revenues to help finance investments based on priorities for that river basin.

At the local level, local governments should develop mid- and long-term strategies on environmental quality and emissions reduction control as well as a detailed implementation plan to achieve the ambient environmental standards. The strategies and implementation plan should be published. In case local governments fail to make a required submittal or make a submittal that is determined to be incomplete, sanctions such as restriction over project approval and an MEP-developed implementation plan should be triggered. Additionally, meeting the ambient environmental quality standards (or their associated interim targets) and total emissions control targets should become the key components of the environmental performance contracts signed by the local government officials.

5. Improve coordination between ambient air quality standards, vehicle emissions standards and fuel standards

Improve China's vehicle emissions standards system

Develop National V emissions standards for light vehicles, durability requirements for the emissions control system for heavy-duty vehicles, and National IV emissions standards for motorcycles. National IV standards will be implemented nation-wide in the 12th FYP. Key regions and cities such as Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta should start using National V standards. Revise emissions standards for low-speed cargo vehicle. Improve the emissions standards for off-road engines, boats, ships and planes. Prohibit the production, sale and registry of vehicles that do not meet national standards. Strictly enforce the Inspection Maintenance Program. In addition, continuous efforts should be made to increase incentives for low emitting vehicles and disincentives for high emitting vehicles in order to speed up the replacement or elimination of "high-emitting" vehicles (such as yellow labeled vehicles). The air quality impacts of transportation

infrastructure need to be evaluated as part of the planning and permitting process. Encourage residents to choose green commuting measures through fuel tax, congestion fees or administrative orders that help keep vehicles off the road. Enhance the attractiveness of public transit system through subsidies and system upgrade.

Increase fuel standards

Authority should be conferred to MEP for fuel quality standards development since vehicle emissions systems are designed for specific fuel quality tolerances. MEP should also be given more authority to oversee the fuel's toxic constituents. Efforts should be strengthened to speed up the development and implementation of fuel quality standards for National IV and V vehicle emissions standards and the emissions standards on hazardous substances from fuels; improve the management on gasoline detergent additives; promote low sulfur fuels for vehicles; and establish a clean fuel development strategy.

6. Strictly enforce Environmental Impact Assessment and “Three-Simultaneous” requirements

Environmental impact assessments (EIA) should be conducted not only on comprehensive planning, functional planning and development projects, but also on major government policies, social and economic development plans. Independent analysis and verification must be carried out to ensure the information presented in the reports is scientifically valid and adequate. Instead of offering only one option for comment and approval, the EIA document should contain a comparison of alternative options to the proposal. Furthermore, qualification licenses for EIA consulting firms should be issued by independent authorities to avoid conflict of interest. The public should be given full access to the complete text of EIA reports and be allowed ample time for comments. The construction of projects should not begin until all EIA requirements have been satisfied and a permit issued.

In addition, it is necessary to revise the existing legal requirements on “Three-Simultaneous” (the design, construction and operation of environmental pollution prevention facilities should accompany the design, construction and operation of the projects) to clarify that pollution prevention measures must be functioning and stay in operation after project construction is completed and operations commence. Any violation will lead to denial, suspension or revocation of permits.

7. Improve permitting system

Connections must be established between permit issuance and total emissions control targets to ensure attainment of environmental quality standards. Allocated total control targets must be strictly enforced and the regional monitoring centers should supervise the permit issuance process unless directly allocated to sources by MEP. Approval of new projects in non-attainment regions should be suspended. New sources discharging pollutants covered by total emission control requirements must offset their added incremental discharges.

Temporary permits during correction period should be eliminated. Enterprises should not be allowed to start up or continue to operate without pollutant discharge permits. Comprehensive requirements for information that must be in the permit should be delineated. Permit applicants should bear the responsibility of providing all necessary information. The permit document also should list and publish detailed information such as types and concentration of pollutants, pollution prevention controls and any emission/effluent or operating limitations and required monitoring, reporting and inspection requirements as established by the government. Transparency in the environmental permitting process will help the general public defend their environmental rights and enforce environmental laws and regulations against pollution violators.

8. Increase penalties for non-compliance and enhance monitoring and inspections

The responsible party should pay the costs of environmental damage to people or property, or economic losses. Compensation should also cover the costs of reasonable measures taken to prevent or limit environmental damage and for clean-up and restoration of the environment to its previous state. Existing caps on non-compliance penalties must be removed. The amount of penalties imposed on polluters must be increased significantly in order to make the cost of non-compliance higher than compliance. Adoption of a cumulative “Per Day, Per Violation Penalty” from date of non-compliance to date of compliance will help to achieve this goal. Additional penalties could be levied based on the severity of the damage caused. Furthermore, China should establish a penalty to capture the economic benefit of non-compliance that has accrued to violators by avoiding the costs of installation and maintenance of required control equipment and failure to meet other environmental requirements.

To better identify and document violations, China must first establish stringent requirements for monitoring, reporting and (where appropriate) certification by

industry owners as well as allocate sufficient resources for inspections by appropriate government officials. China should establish requirements for electronic monitoring of pollution through continuous emissions monitoring systems (CEMs), including specific regulations governing quality control and quality assurance associated with the operation of these automated monitoring systems.

9. Improve environmental information disclosure and public participation

Environmental information should be made available to the public in a timely and accurate manner. For example, monitoring results under the newly revised Ambient Air Quality Standards should be published for 113 key environmental protection cities in 2013 and for all cities in 2015. Data on air quality in key cities will be disclosed in form of forecast and daily report. Online monitoring data on the quality of surface water should be disclosed every four hours. Data on section water quality in key river basins will be disclosed weekly. Lists of key projects subject to national pollution reduction mandates should be disclosed. Sensitive information such as heavy metal and landfill pollution should be published and followed up in a timely manner. Information on large environmental incidents, as well as the treatment and follow-up measures, should be released in a timely manner. Name lists of key emitters and emitters who violate laws should be disclosed.

In addition to guaranteeing meaningful public participation in the EIA process, public hearings should be held prior to the government's adoption of environmental laws, regulations, policies and approval of projects with significant environmental impacts. Notices for public hearings should be published on line, in a newspaper, posting on and/or near real property that may be affected by the matter being addressed in the hearing, and mailing notice to specific parties. The notice should be provided a number of days (7-10 days) before the hearing. Furthermore, revisions should be made to the current environmental laws to empower environmental public interest litigation.

10. Promote the use of market mechanisms

China has been experimenting with market instruments such as Eco-Compensation Mechanisms (ECMs), SO₂ emissions trading, carbon emissions trading, and water rights trading to supplement the command-and-control system. However, the government has been the major driving force behind these mechanisms, and the use of market measures needs significant improvement. For example, the development of eastern China heavily relies on the energy and resources supply from the western part

of the country. But the payment for ecological services from the east is far from sufficient to cover the ecological deterioration suffered by the west.

China needs to increase the use of market-based economic incentive tools such as taxes, emissions trading, and natural resource pricing and establish supporting policies, institutions, and guidance for each of the market-based policy alternatives under consideration. At a minimum, control levels (caps) need to be set, procedures for the allocation of resources and control responsibilities, for monitoring and reporting performance (linked to emissions and performance reporting), for tracking emissions, for registering transactions, for establishing compliance, all need to be developed, tested, and deployed. Furthermore, setting up a Clean Production Fund will help provide incentives for existing enterprises to transition to clean production methods, and for new enterprises to design for clean production at start up.

A Final Word

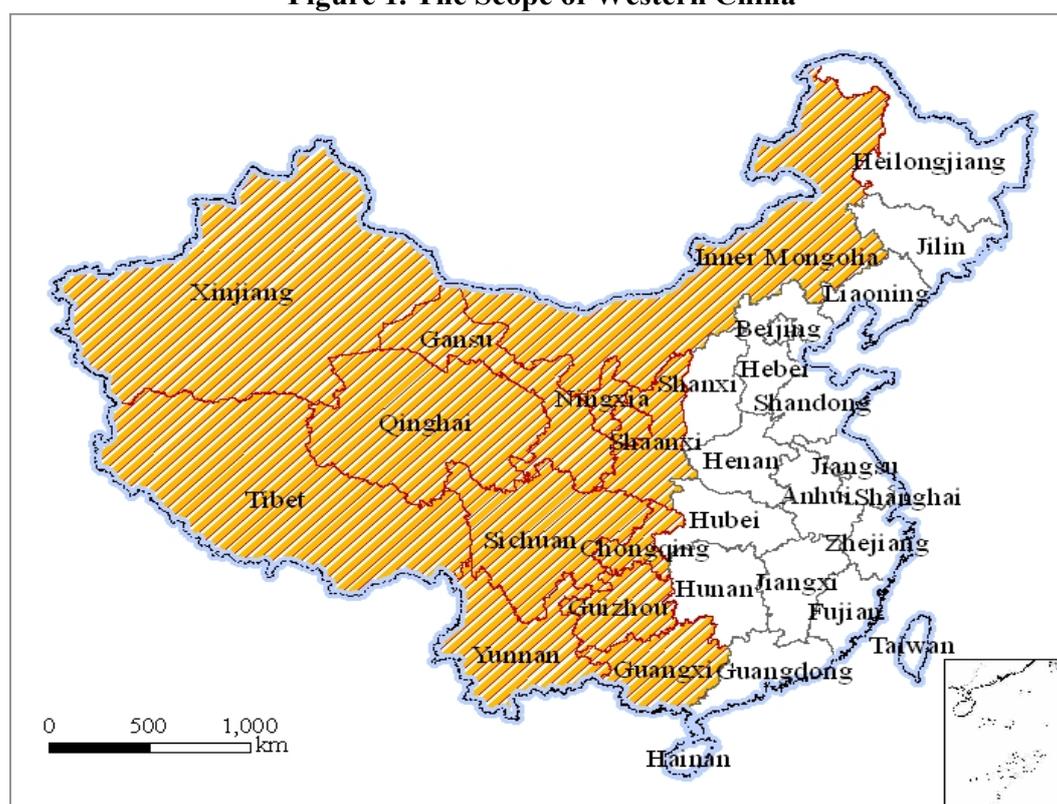
The list of recommendations highlighted in this concluding section is formidable. Implementing them will not be an easy task and will strain the existing capacities at MEP. However, as the public's demand for environmental quality increases, the government must respond by serving the people with an efficient and effective environmental management system. It is our hope that the work of this Task Force is a small contribution to this need.

Strategy and Policies on Environment and Development in Western China

1. INTRODUCTION

Western China (W. China) comprises 6.87 million square kilometres, accounting for 71.54 per cent of China and a population of more than 360 million. The region includes 12 provinces, municipalities and autonomous regions, and is home to 55 ethnic minorities (see Figure 1 and Table 1).

Figure 1. The Scope of Western China



This region's economic, environmental and human capital or assets and challenges make it critical to China as a whole (see Table 1). It holds the country's most vital mineral and energy sources, its most significant ecological and natural resources, including water, and is home to its most culturally diverse and poorest populations. The National Development and Reform Commission has identified targets for regional growth and socio-economic income levels higher than the national average rate³⁷ on the basis that this is necessary to reduce regional inequity and

³⁷ NDRC. *Twelfth-Five Year Plan for Western Development*, February 2012.

narrow the gap between Eastern and Western China. But the gaps are not just about regional economies and the income of residents in the western region. Arguably the more difficult inequities and barriers relate to social and human capital and the unequal access to public services and social harmony.

Table 1. The Strategic Importance of Western China – Overview

Social cohesion and national security	<ul style="list-style-type: none"> Accounting for 71.54% of the terrestrial land area of China All of 55 ethnic minority groups With a population of 360.38 million, 27.04% of the national total³⁸
Resource and energy security	<ul style="list-style-type: none"> Accounting for 81.1% of exploitable water resources³⁹ All of 171 types of mineral resources 132 types of mineral reserves has been proven Accounting for 67% of China's fossil energy Accounting for 65% of China's renewable energy sources⁴⁰
Ecological security	<ul style="list-style-type: none"> Having 85% of China's national nature reserve areas⁴¹ Having 70% of the state-level protected ecosystem and species Accounting for more than 65% of ecological service value of China⁴²
Poverty alleviation	<ul style="list-style-type: none"> Accounting for 66% of China's poverty population⁴³ Poverty rate is almost 17 times that of the eastern area 95% of absolute poverty population of China are in minority nationality areas, remote areas, border areas and ecologically fragile area, and these areas are mainly in western region The illiteracy rate among adults (above the age of 15) is 5.41%, 1.33 per cent higher than the national average⁴⁴
Urbanization	<ul style="list-style-type: none"> The western region urbanization rate is 28.70%, which is 7.52 per cent lower than the national average in 2000; after 10 years development, the urbanization rate had increased to 40.48%, which is still 9.20 per cent lower than the national average.
Industry development	<ul style="list-style-type: none"> The per capita GDP is 25% lower than the national average The output of energy and mining industry account for 63.41% of the regional output of industry. Emissions of the 'three wastes' per 10,000 yuan industrial value-added is 1.1 times more than national level
Transformation of economic structure Domestic demand playing larger role	<ul style="list-style-type: none"> W. China is a vast area, with an economy below other parts of China. There is huge potential for expanding regional domestic demand.

³⁸ NBSC (National Bureau of Statistics of China). *China Statistical Yearbook*, 2011, Beijing

³⁹ Xiangzhi Kong, Yingchun Hu. Superiorities, *Emphases and Countermeasures on Development of Energy Industry in China's Western Region*, Ecology and Environmental Sciences, 2012, 21(1): 94-100

⁴⁰ NBSC and Ministry of Environmental Protection. *China Statistical Yearbook on Environment*, 2009, Beijing

⁴¹ Zhiyun Ouyang, Hua Zheng. *Ecological mechanisms of ecosystem services*, Acta Ecologica Sinica, 2009, (11):6183-6188

⁴² Ecological Environment Protection Research Center, Tsinghua University. *Current status and adaptive strategy of ecological environment in the western region* (in Chinese). China Development Observation, 2009 (05):29-33

⁴³ NBSC. *China Statistical Yearbook*, 2010, Beijing

⁴⁴ NBSC. *China Statistical Yearbook*, 2011, Beijing

The CCICED Western China Task Force is focusing on developing a roadmap and policy recommendations for the green development of W. China at a time when there is significant national and international financial uncertainty and slowing growth on the global stage. China has a strong record and commitment to growth. Its growth rate has no international peer, tracking 10.7 per cent over the last decade.⁴⁵ China has also made strong commitments to share the proceeds of this growth equitably across the country and to reduce disparity at both the regional and individual level and has recognized the need to do so in a manner that is more environmentally sustainable.

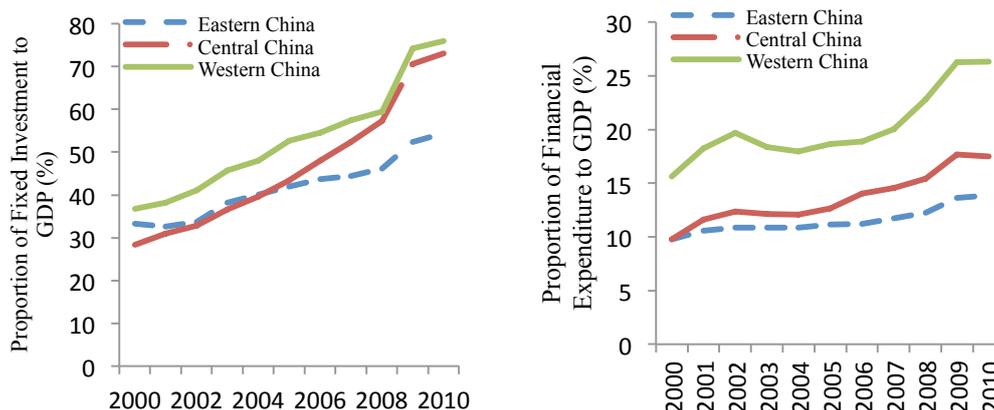
The western provinces are growing rapidly. Over the last decade, the region has achieved an average growth rate of 17.20%, which is faster than the national average. Of the five regions with the highest growth rates last year – Chongqing, Tianjin, Guizhou, Sichuan and Inner Mongolia – four are located in western China.⁴⁶ By contrast, the five regions with the lowest growth rates – Beijing, Shanghai, Zhejiang, Guangdong and Shandong – are all on the east coast. These regional growth variations will help to narrow the income gap between east and west in China. Per capita income in Shanghai (the highest in the country) was 9.2 times as high as that in Guizhou (the lowest) in 2005. This had fallen to five times in 2011, according to the National Bureau of Statistics (NBSC).

Several factors have contributed to better growth performance in W. China. Massive resources have been diverted to the western region, and capital accumulation in W. China has accelerated in recent years (resource-driven economic growth; see the trend of proportion of fixed investment to GDP and proportion of financial expenditure to GDP in Figure 2). Manufacturing has also relocated from the coastal areas to the inland and western regions. NBSC data show that W. China accounted for 18.8 per cent of national industrial output last year, compared with 13.9 per cent in 2000. During the same period, the six central provinces have also gained in terms of industrial-output share (from 19.1 per cent to 21.3 per cent). But the high proportion of fixed investment in GDP means the economy of W. China is highly dependent on government. It has also been suggested that manufacturing activities are shifting westward as a result of rising wages and the subsequent shortage of labour in coastal areas and relative weakness of environmental oversight mechanisms in W. China.

⁴⁵ China Daily, 12 September 2012, *Toward a brighter future for the Chinese economy*

⁴⁶ NBSC. *China Statistical Yearbook*, 2011, Beijing

Figure 2. Proportion of Fixed Investment and Financial Expenditure to GDP



Source: *China Statistical Yearbook* (2001-2011).

Past growth has been achieved in “an environmentally profligate way” and “the overall situation (in China) continues to deteriorate”, and has relied on the primary and secondary sector while the development of the tertiary sector is too slow.⁴⁷ Energy consumption per unit of output (energy intensity expressed as kg/100 yuan) in the western region is on average much higher than that in the coastal provinces. Beijing and Guangdong recorded the lowest energy intensity (about 80 kg/100 yuan) in 2011 while the highest energy intensity was observed in Ningxia (five times as high as the best performer) and Qinghai (four times). Furthermore, growth in W. China has not been sufficiently translated into an increased overall standard of living for its residents. In addition, human capital has been and still is flowing to the eastern region.

The challenge for the CCICED Western China Task Force is not to limit growth but rather to provide a roadmap to help direct that growth: to build on increasingly strong political commitments contained in successive Five-Year Plans, and to bring environment and people (society) to the centre of economic decision making. And to ensure that future growth is not at the cost of the environment and with wealth shared unequally. This is *an environmentally sustainable development challenge* [that] *is arguably the most complex and difficult that any country has ever tried to confront.*⁴⁸

Nearly 80 per cent of territories in W. China are identified in the Main Functional Zoning Plan of China as either “restricted” or “prohibited development”

⁴⁷ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012, p.6

⁴⁸ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012, p.xviii

zones (see Chapter 3, discussion of Main Functional Zoning). This acknowledges the fragility and ecosystem values of Western China, with the intention of retaining ecosystem functions during economic and social development processes. As a result of strong political focus, there have been significant investments of capital and increasingly stringent targets intended to incentivize improvements in per capita income, natural resource management, pollution reduction and GDP growth.

However, many key health, environment and social metrics for W. China have not demonstrated a rate of positive or sustainable change commensurate with the expectations of the Chinese government, key central or provincial officials, or of communities. According to 2009 estimates by the Chinese Academy of Sciences, for environmental quality to be maintained in W. China at a level similar to that in 2000, resource efficiency would need to increase by a factor of 4 to 5, and the environmental footprint per unit of GDP to decrease by 75 per cent.⁴⁹

The case for change is clear. W. China is the custodian of the nation's greatest prospective natural resource wealth, so is at the heart of China's long-term growth plans. Deterioration or poorly executed use of its natural resources, including water, or well-intentioned but poorly coordinated or implemented wealth creation and social welfare interventions, could have profound negative impacts on China's future wealth, environmental and societal health and wellbeing.

There are also clear opportunities for China as a whole in the way it determines the future nature of growth in W. China. The central government clearly holds the major levers for change through the manner in which it invests its capital, targets its support for industry and innovation, sets its rules for natural resource planning and land use, and through the priorities and means by which it delivers programs to address social and human capital inequities. Diversity within W. China also requires a rethink of relationships between the national and provincial governments in order to make growth more sustainable. There is a need to better align and leverage the shared aspirations of the central and provincial governments as they relate to economic, social or environmental considerations, rather than have these goals independently pursued in an uncoordinated, or agency/project based focus.

China needs W. China to have a green growth trajectory built on the strong policy commitments in the Five-Year Plans and applied to the next steps. The Task

⁴⁹ China Academy of Science. *China sustainable development strategy report 2009 – China's approach towards a low carbon future*, Beijing: Science Press, May, 2009

Force recognizes that if Western China fails to achieve such a green growth trajectory, all of China will pay the costs in the economic, environmental and societal spheres.

1.1 Scope of the Task Force

The Task Force has been established to identify major issues in the process of ecological and social economic development faced by W. China, especially for improvement in the relationship between environment protection and economic development; to propose a green development strategy adapted for western conditions of economy, population, resources and environment in the next 20 to 40 years, and to make some policy recommendations for accelerating progress towards green development in W. China.

The Task Force identified specific work objectives from its Terms of Reference as follows:

- Understand past and current Five-Year Plans, the China Western Development Strategy and applicable policy measures in order to identify potential improvements.
- Analyze development and structural needs that require immediate policy actions and/or long-term transformational institutional development and policy setting.
- Identify key drivers for regional green development opportunities in W. China.
- Set out a roadmap and provide concrete policy recommendations, which expand on existing policy directions and initiatives and translate them into practical priorities and measures for a green development strategy in Western China.

This Task Force was officially launched on August 4, 2011 and has translated these objectives into the following five tasks that are the subject of the following chapters.

Task 1: Analyze environmental features and carrying capacity.

Task 2: Assess socio-economic realities, development strategies and models.

Task 3: Review international experience on integrated regional development of environment, economy and society.

Task 4: Develop a roadmap for green development for the western region.

Task 5: Produce green development policy recommendations for W. China.

1.2 Approach

The Task Force undertook a limited desk top analysis and worked on understanding and finding solutions for six policy areas: (a) managing and restoring

fragile ecosystems; (b) managing energy and mineral resources and pollution control; (c) improving labour quality and diversity for poverty alleviation; (d) promoting sustainable urbanization; (e) promoting green and inclusive industrial development; and (f) Institutional and policy settings as facilitator and driver. In so doing the Task Force chose not to pursue specific issues such as climate change, energy development, biodiversity protection and many others.

Time constraints limited the scope and extent of the work and the number of regional consultations. The Task Force briefly visited a limited number of sites and talked with industry leaders and officials in two provinces to help its understanding of the larger issues. Two provinces with very different features and challenges were selected: *Sichuan Province* has experienced rapid industrialization and urbanization, and strong industrial transformation; while *Qinghai Province* is characterised by fragile ecology, which requires careful management to meet both regional and national ecological service needs. Both provinces have areas of high poverty and resource pressures.

The Chinese and international members met with officials from central government and the two provinces during both the research phase and during the drafting of recommendations focused on the major issues. More than 50 stakeholders from industry and different levels of government have contributed their thoughts and feedback, fundamentally influencing final recommendations of the Task Force. The Task Force also undertook a brief visit to Australia where considerable insight was gained on a number of relevant technical and governance innovations.

1.3 China's green development – an inevitable strategic choice

The core development challenge facing every jurisdiction today is how to achieve human development while maintaining essential ecosystems. China has achieved significant economic development and progress toward a truly prosperous society, but at the expense of the environment, and a widening gap between the rich and the poor. Consequently there are shifts: from “black” to “green”, from “ecological development” to “ecological construction”, and from “ecological deficit to ecological surplus”.

Box 1. China's Choice on Future Development

Premier Wen Jiabao has said: “*China is determined to take a path of civilized development which*”

ensures that production increases, people's living standards rise, and we live in a sound ecological environment.”⁵⁰

“A political awareness and consensus has thus emerged that China can no longer afford a continuous ‘black’ economic growth in the face of these serious resource bottlenecks. Environmental issues and social concerns are no longer merely the negative ‘side-effects’ of China’s economic growth. China now finds itself in a loop, in which resource bottlenecks, environmental degradation and social discrepancy are causing serious economic problems and preventing a continuous and sustainable economic growth. A green transformation of the Chinese economy is therefore an inevitable strategic choice that aims to curb resource utilization and ecological degradation, and at the same time improve economic efficiency as well as social inclusion and stability.”⁵¹

However, while there has been considerable investment in and some progress to improve essential environmental outcomes such as clean air, water and overall ecosystem services, many environmental and health conditions are being negatively affected, including in W. China. The challenge now is how to most effectively translate the new direction into effective action at a regional level.

1.4 China is at a crossroads of transformation

Chinese leaders have recognized that the country is now at a crossroads of transformation. Entering the 21st century, China is pursuing economic and social development under the guidance of the “Scientific Outlook on Development”, accompanied by a fundamental principle that calls for putting people first and promoting balanced and sustainable development in all areas. Making economic and social development compatible with the preservation of the natural environment has become a significant issue for China. Seeking a green, low-carbon economy, an emerging global policy agenda, has also become China’s strategic choice. This political aspiration and concrete initiatives are manifested in China’s 12th FYP.⁵²

China faces significant transformational challenges and necessary shifts:

- **Balance:** Moving from a narrow economic model to one protecting and enhancing natural, human and economic capital.
- **Structural:** Changing from an investment-driven primary and secondary industrial model to one giving greater prominence to services and domestic consumption, while also modernizing specific employment sectors.
- **Technology:** Taking advantage of new technologies and innovations requiring human capacity building and R&D investment to enable a green industry model.

⁵⁰ Xinhua Net. 25 April 2012. *Speech by Premier Jiabao Wen at Stockholm+40 – Partnership Forum for Sustainable Development*. http://news.xinhuanet.com/world/2012-04/25/c_123036994.htm

⁵¹ CCICED Annual General Meeting 2011. *Development Mechanism and Policy Innovation of China’s Green Economy*. Beijing, 15-17 November 2011, p. 208

⁵² Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012, p.144

*“In 2011, the coastal region spent, on average, more than 2 % of their income on R&D; in the western region the figure was about 0.5 %.”*⁵³

- **Institutional:** Shifting from government-driven financial and regulatory models to a better-functioning market economy; with governmental institutions more focused on complex interrelationships of green development.

To support and realise green transformation at the national level, the regional dimension will be key for making fundamental and real changes on the ground. This is of particular importance for China given the sheer size of the country as well as the large diversity across regions. Alongside strong leadership at the top level, a multiple-level coordination as well as a genuine commitment and clear mandates at the regional level are necessary conditions for enhanced institutional capacity, for improved quality of implementation as well as for broad engagement and inclusiveness in China’s green transformation. We believe it is advisable for China to take a regional approach when preparing a national green development strategy.

In W. China the broad national challenges are further exacerbated by:

Regionally uneven development Economic development is rapid in the eastern coastal areas of China while the western region is relatively backward. It accounts for 63.34 per cent of the total poverty-stricken counties⁵⁴ in China and more than half of the ecologically vulnerable counties.⁵⁵ It is necessary to explore new development strategies to solve the problem of regionally unbalanced or uneven development. There is a major trend in China to promote industry transfer to the western region and accelerate its development. Without scientific guidelines and rational planning, development acceleration in the western region would put more and more pressure on its vulnerable eco-environment and increase pollution there.

Close attention to environment and development to implement the China Western Development Strategy and promote sustainable development W. China supplies significant environmental services but is an ecologically fragile area with complex climatic conditions. Ecosystem degradation trends have not been halted. The challenge is to arrest the decline in *regulatory services* while simultaneously increasing the *provisioning functions* of environment services.

⁵³ China Daily, 24 August 2012, *Balance of economic power shifts*.

⁵⁴ <http://www.cpad.gov.cn/publicfiles/business/htmlfiles/FPB/fpyw/201203/175445.html>

⁵⁵ Ministry of Environmental Protection of Republic of China. *The National Plan on the Ecological Fragile Zone Protection* (huan fa [2008] no.92), 2008

Distinct environment and development strategy and policies are needed for W. China

W. China plays a key role for the whole of the nation. This has been recognised in China's Main Functional Zoning, in particular by designating large areas of restricted development along with a large number of national nature reserves in the region.

Significant financial expenditure on eco-compensation and ecological construction to protect and enhance provisioning and regulating services recognise this reality but *“much environmental investment is made through special campaigns that are hastily conceived and implemented to respond to environmental incidents or emergencies. This approach is inefficient, too top down and extremely unpredictable.”*⁵⁶

At the heart of a green regional development agenda is a differentiated approach, taking into account region-specific development needs and constraints, and more importantly, identifying and creating context-specific green development enablers and opportunities, which bring a transformation of both mind set and practice, including:

- Indigenous capacity building and self-sustaining development.
- Refining and strengthening top-down, subsidy-based national support .
- Viewing environmental protection and ecosystem conservation as wealth generation and job creation from natural capital and environmental assets.
- Departing from concentrated and investment-driven industrial development towards a diversification of economic and employment structure.

The Task Force identified that China, and W. China in particular, needs a new conceptual framework setting the idea and practice of green development in the context of China's sustainable development, with specific goals for W. China.

2. CONCEPTUAL FRAMEWORK FOR GREEN DEVELOPMENT

2.1 International context

The 2008 global financial crisis accelerated concerns over development models that have relied heavily on resource depletion, leading to serious environmental pollution and ecological crisis. Green Economy (GE) was seen as a new vehicle for creating economic, social and environmental benefits, including the idea of “green

⁵⁶ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People's Republic of China*. Philippines, 2012, p.xxi

growth”, a notion launched at Group of 8 and Group of 20 meetings⁵⁷ and via the OECD⁵⁸. The United Nations Environment Programme (UNEP) launched the “Green Development Initiative” together with a “Global Green New Deal” to mobilise and re-focus the global economy towards investments in clean technologies and “natural” infrastructure. National green growth initiatives were established by several OECD countries. The theme of the green economy was the key focal point of the June 2012 Rio+20 global meeting on environment and development. Nations including China endorsed the meeting outcome, a document entitled *The Future We Want*. Green transformation has garnered the attention of decision-makers in both rich and poorer nations. Much of the attention has been directed to regions suffering from poverty.

2.2 Green development in China

Harmony between human and environment is a concept embodied in China’s traditional values. Over 2000 years ago, Chinese philosophers called for maintaining “unity between nature and man” and following “the law of nature” to achieve harmony between mankind and nature. This harmony can be considered the ultimate goal in pursuing green development. And the philosophy was echoed in the sustainable development concept upon its introduction into China. Since 1996, sustainable development has been one of China’s basic national strategies.

The 2002 UNDP China Human Development Report, *Making Green Development a Choice*, provided valuable insights into the definition of Chinese green development. The report suggested that: “*Green development stresses unified and harmonious development of the economy and environment, a positive path of people-centred sustainable development.*”⁵⁹

Since then, China has adopted a number of concepts important for sustainable development, including the “people-centred” approach, scientific development concept, harmonious society, environmental-friendly and resource-saving society, and ecological civilization. More recently green economy and green development concepts have been embraced by academics and the government of China. In recent years, the CCICED has formed several task forces to conduct studies along these lines,

⁵⁷ The Group of Twenty Annual Meeting’s Summit. *Inclusive, Green and Sustainable Recovery*. London, 2 April, 2009

⁵⁸ OECD(The Organisation for Economic Cooperation and Development). *Green Growth Strategy*, November, 2010

⁵⁹ UNDP(United Nations Development Programme). *China Human Development Report 2002: Making Green Development a Choice*, Oxford University Press, 29 August, 2002

including the 2011 Task Force on Research on the Development Mechanism and Policy Innovation of China's Green Economy.

The 12th Five-Year Plan on Economic and Social Development is considered to be the first national green development plan for China. It formally adopted green development for building a resource-conserving, environment-friendly society, developing a circular economy, actively responding to climate change, and building a national disaster prevention system. One of the highlights of this plan is the concept of *net economic and social welfare maximization*, which not only means maximizing social welfare but also the minimization of the cost of economic development.⁶⁰ The net economic and social welfare benefit might be calculated as “Green GDP”, a metric for quantifying economic, social, human and natural capitals, and for environment pollution. However, Green GDP has not yet been fully adopted in China.

2.3 The conceptual framework

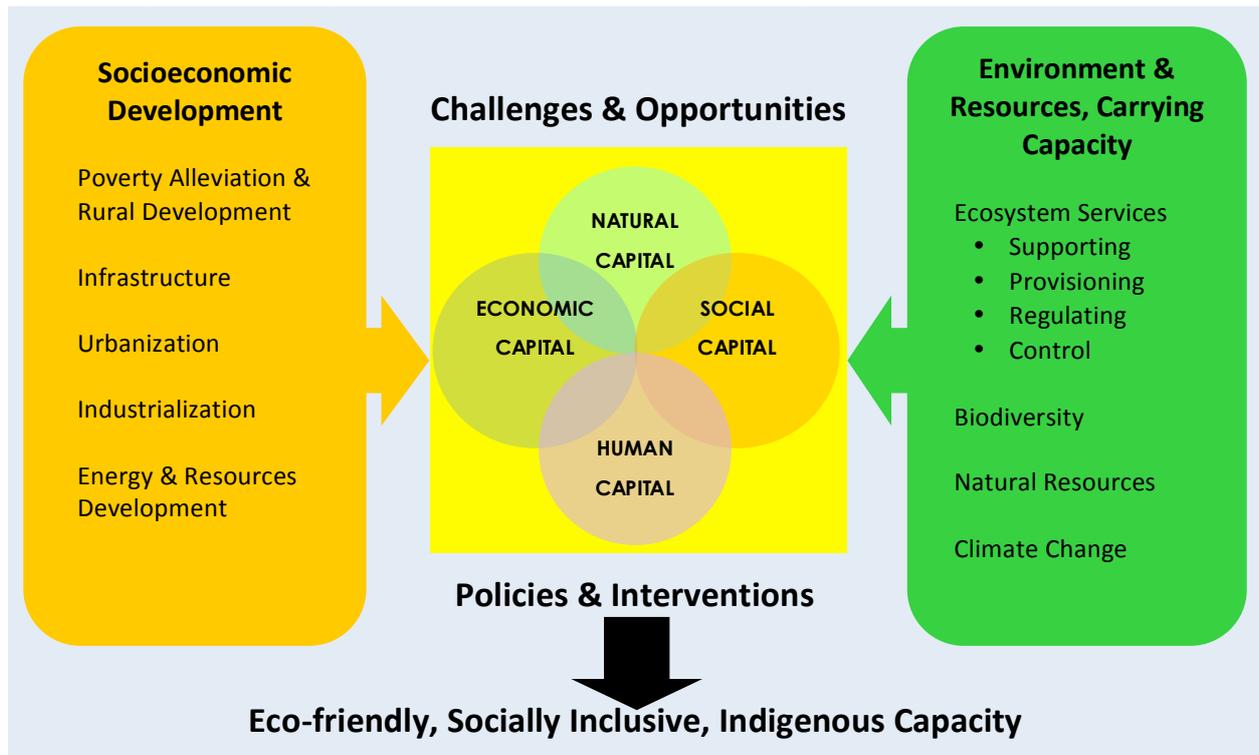
2.3.1 Core of green development in Western China

The Task Force has developed a conceptual framework for the green development of W. China, which guides the analysis and development of policy recommendations of this Task Force (see Figure 3).

The Task Force defines the core of green development as integrated development of four “capitals”: natural, economic, social and human capital. Only when these four capitals are built up and enhanced in a well-balanced way can green development in W. China be meaningfully achieved. Only pursuing growth of economic capital while massively depleting natural capital is a mind-set that is obviously unsustainable. On the other hand, purely emphasizing protection of natural capital without developing economic capital will not achieve the ultimate objective of welfare and human development.

⁶⁰ Wenhui Daily, The speech made by Professor Hu Angang at Expo Forum, 17 October 2010. *Environmental Changes and Urban Responsibilities*, <http://2010.eastday.com/G/20101017/u1a812903.html>

Figure 3. Conceptual Framework for Green Development in Western China



In addition, the green development of Western China must be balanced and coordinated with other regions; that is, it must not hinder the green development of other regions, and the cooperation of other regions will promote the process of green development in Western China.

Natural capital, the fundamental or supporting basis of social and economic activities, includes every natural element playing a role in any economically productive process. It includes stocks of clean water and air, animals, plants, minerals, energy sources, forests, fisheries, all elements of biodiversity and ecosystems that support them. Compared to Eastern China, W. China has rich and diverse natural resources, forming a solid physical foundation for economic and social development not only for the region itself, but also for the rest of China.

Therefore, the most important issue for green development in W. China is to reduce over-dependence on natural resources as much as possible, and to make sure that the overall quality and quantity of natural capital is maintained at a level that can generate sustained service to support long-term economic growth and human wellbeing not only for W. China, but also throughout the country and the rest of Asia.

Economic capital, in the green development context, mainly refers to the regional economic capital stock, including infrastructure, fixed assets, technology progress and production capacity, and funds available to invest in economic, social and human development and environmental protection. It is the foundation of well-being plus social and human development. Being supported by natural capital, it can also provide necessary resources to strengthen natural capital, or to facilitate “growth of limits”.

Human capital can be interpreted as a stock of capabilities, which can yield a flow of services; that is, productive capabilities of human beings. Not only human knowledge, education, training and skills, but also useful behavioural habits as well as people’s levels of energy, and physical and mental health. It is important for the green development of W. China because these capabilities drive the development process. But comparatively weak human capital in W. China, in terms of overall education, labour skills and health, will be an obstacle for achieving high development expectations in the region. Unless human capital is further enhanced, there will be a lack of indigenous capacity to drive long-term green development.

Social capital often refers to characteristics of a society that encourage cooperation among groups of people (for example, workers and managers) whose interdependent efforts are needed to achieve a common goal such as efficient production. Trust among people, mutual understanding, shared values, and socially held knowledge for social coordination of economic activity are social capital elements. Western China has a far more complex social structure than the rest of China, given the region’s diverse cultural and ethnic composition. Unless the process of regional development is inclusive, it will be impossible for W. China to achieve economically strong, environmentally sound and socially equitable development. Social exclusion in Western China would add further burdens to vulnerable/disadvantaged social groups, while exacerbating poverty and severe social stability issues, with the risk of undermining the overall development of China.

The Task Force believes that green development in W. China can achieve the overall development and balance of these four capitals. A traditional development mode of pursuing maximum economic growth at the cost of the ecological environment will destroy the long-term sustainability of W. China. Under the current “Two Higher” target⁶¹ for Western China (that is both the economic and the income growth rate for urban and rural residents in the western region must be higher than the

⁶¹ NDRC. *Twelfth-Five Year Plan for Western Development*, February, 2012.

national average from 2011-2015), there are significant risks that GDP-driven economic growth would be the single most important driving force for development in the region during the 12th FYP period – which inevitably would be at the cost of the ecological environment. In such a situation it is reasonable to expect that natural resources would be extracted to the greatest extent possible, industries would be fully promoted for GDP growth, and natural capital would be extensively cashed in for GDP and income generation, because meeting the “Two Higher” target is the true incentive for career development of government officials.

2.3.2 Three special features of green development in Western China

For W. China, the path towards green development requires a roadmap that can identify and address various special regional features. Green development in W. China has three core features, which must be highlighted as desired outcomes.

Eco-friendly growth pursues socio-economic growth while maintaining or improving the ecological environment. It promotes a new economy featuring low carbon and high resource efficiency practices, while developing environmentally sustainable “products”. It respects finite carrying capacity of natural environment and enhances ecosystem service functions that can sustain genuine wealth and prosperity. Eco-friendly growth is particularly important for W. China due to its important ecological function and fragile ecosystems.⁶²

Indigenous capacity is one of the most urgent needs in order to generate economic growth without other forces brought in from outside. The China Western Development Strategy, implemented in 1999, obviously promoted economic growth in the western region. According to statistics, the total GDP of 12 western provinces increased from 4.54 trillion *yuan* in 1999 to 23.20 trillion *yuan* in 2011, an increase of 4.3 times.⁶³ However, the increase was mainly supported by capital inputs, not indigenous economic driving forces, such as technical advancement and regional human capital accumulation. Without large transfer payments and preferential policies of central government, economic growth of Western China can barely be maintained.

Without strong indigenous development and wealth creation capacity, such a high dependence on funding and outside investment is unlikely to achieve long-term prosperity in Western China. To stimulate and sustain its green development, W. China must enhance its own economic, social, human and natural capital.

⁶² Zhiyun Ouyang, Hua Zheng. *Ecological mechanisms of ecosystem services*, Acta Ecologica Sinica, 2009, (11):6183-6188

⁶³ NBSC, *China Statistical Yearbook*, 2000 and 2011, Beijing

Social inclusiveness is a core features that can be realized by creating buoyant local economies, improving degraded built and natural environments, by promoting community involvement and educational opportunities, and by improving living conditions and quality of life. The most prominent and recurring challenge across all areas of social inclusiveness is to join up and balance environmental, social and economic objectives. Even with recent rapid economic development in W. China there is a growing gap of per capita income between Western and Eastern China. Poor rural communities and ethnic minorities are not adequately mainstreamed into, or proportionally benefiting from the massive economic development of the nation. About 100 million people, mostly W. China, still live below the official poverty line.⁶⁴ Continuing social exclusion in W. China would pose a significant risk for the nation in terms of the quality of overall green development and social stability.

3 CHALLENGES AND OPPORTUNITIES

The region presents distinct challenges and opportunities for green development, which are summarized in this chapter. We consider the issues from the perspective of six policy areas that, considered collectively, describe the green development “map” of Western China. The following discussion presents highlights from the detailed analysis contained in the *Strategy and Policies on Environment and Development in Western China – Technical Report*.

3.1 Managing and restoring fragile ecosystems

Current status

Much of the western region is ecologically important for biodiversity (for example, grasslands and wetlands), is naturally fragile (for example, the Loess Plateau) or prone to hazards (desertification, mass movements and earthquakes). Human activity over the millennia has diminished some of the values and exacerbated some of the problems. Vast areas have experienced deforestation, reduced biodiversity, soil loss and desertification. Recent human-induced phenomena like climate change are increasing the pressures and rapidly changing the nature and characteristics of critical values and resources in the region.

- **Grassland ecosystem** is the main ecosystem in W. China, with an area of about 287.44 million ha, accounting for about 42.77 per cent of the total land area of the western region. In the “Three-River” source region, grassland has been affected by human factors such as over-grazing, excessive reclamation and digging and

⁶⁴ Chinese Academy of Science. *China Sustainable Development Report 2012 – China’s Sustainable Development in Shifting Global Context* (in Chinese), Beijing: Science Press, 2012

the poor management of grassland and stockbreeding development, leading to degeneration and desertification of the natural grasslands on a large scale. Grassland degradation, especially black-soil grassland degradation, has caused serious ecological environment deterioration problems.⁶⁵

- **Wetland ecosystem** represents a total area of 21.47 million hectares, which accounts for about 3.2 per cent of the total land area of the western region. A large amount of wetland has disappeared as the result of negligent exploitation of land resources or has been replaced by man-made wetlands, while remaining wetland has atrophied heavily.⁶⁶
- **Water resource imbalance.** Abundant in the south and west (the “water tower” of China) but very scarce in the north and east of the region, this “lifeblood” of Chinese civilization is now extensively polluted in quality and restricted in quantity. The west is the essential source of water for hydroelectric power, coal washing, industry and agriculture, for residential consumption and for waste removal throughout the region and the rest of China. Climate change is an increasing threat to this vital resource since it is altering the hydrography of the glacier-fed rivers of the west and increasing the variability and intensity of both droughts and floods throughout.⁶⁷ Lake levels have fallen, and some lakes have dried up completely. For example, Bosten Lake, in Xinjiang, the water level has decreased by 3.45 meters over the last 30 years. Moreover, this lake transformed from freshwater to saltwater in just 10 years.⁶⁸ Its management is now a national challenge.
- Western China, especially in the Loess Plateau, is the main area of **soil and water loss**, in 2009 totalling 3.86 million ha⁶⁹ of the 12 western region provinces.
- **Land degradation**, including desertification, rocky desertification and soil salinization, is becoming the uppermost ecological problem in W. China. For example, by the end of 2005, the rocky desertification area of Guizhou had reached 3.32 million ha, 25.6 per cent of the national total.
- **The loss of biodiversity** is another significant issue in Western China, where there are abundant wildlife species. Some species are unique to Western China, and south-western China is recognized as one of the 25 global biodiversity hotspot areas. However, many rare and endangered species in the region are losing their habitat and facing extinction. In response, China’s central government has committed significant financial resources and established nature reserves (1100 in the region, comprising 85% of the national total). Main Functional Zoning identifies restricted development areas and has imposed ecological migration on many small communities. Strategic biodiversity plans have been prepared for major communities such as Chongqing.

⁶⁵ Zhiyun Ouyang, Xiaoke Wang, Hong Miao. *A primary study on Chinese terrestrial ecosystem services and their ecological-economic values*, Acta Ecologica Sinica, 1999, (05):607-613

⁶⁶ Xiaoke Wang, Zhiyun Ouyang, Hong Miao. *Formation, evolution and protection of wetland ecosystems in arid region, North-western China*, Territory & Natural Resources Study, 2003, (04):52-54

⁶⁷ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012, p.75

⁶⁸ Zhiyun Ouyang, Tongqian Zhao, Xiaoke Wang, etc. *Ecosystem services analyses and valuation of China terrestrial surface water system*, Acta Ecologica Sinica, 2004, (10):2091-1099

⁶⁹ Xiaoke Wang, Zhiyun Ouyang, Han Xiao, et al.. *Distribution and division of sensitivity to water-caused soil loss in China*, Acta Ecologica Sinica, 2001, (01):14-19

- **Geological hazards.** A combination of natural conditions and negligent human activities has increased the occurrence and economic consequences of natural disasters in China over the past 50 years due to a combination of factors including climate change.⁷⁰ For example, in Xinjiang Autonomous Region, in which 15 of 22 types of geological hazards exist, relatively large-scale geological disasters occurred 50 times in 2003, but sharply increased to 321 in 2010.⁷¹

The central government has, through successive FYPs, undertaken many initiatives intended to address these issues. Many of these initiatives have achieved significant progress, such as the success of the “Grain for Green” and the “Sloping Land Conversion” programs in the reforestation of 21.77 million hectares.⁷²

Challenges

Lack of integration and consistency among various initiatives is a big problem. Main Functional Zoning was proposed in the 11th FYP⁷³ as a tool of planned regional sustainable development designed to zone lands at national and provincial scales: for economic development and urbanization, and for protection of land with high ecological and food production capabilities (see Table 2). Zones are identified based on nine quantitative indicators (for example, cultivable land, ecosystem fragility and importance, economic development, natural disaster risk, etc.) and strategic choice, a qualitative consideration. Western China is predominately zoned as Restricted Development with limited Key Development areas (see Figure 4). The very large scale of the zones, lack of local government capacity and the limited policy guidance and enforcement over the application of Restricted Development, constrains the practical utility of the current system as a tool for green development. The system has considerable practical potential for application at the sub-provincial scale. However, to be meaningful it must explicitly link with the EIA process and urban planning and provide the necessary direction in land and natural resource use decision making.

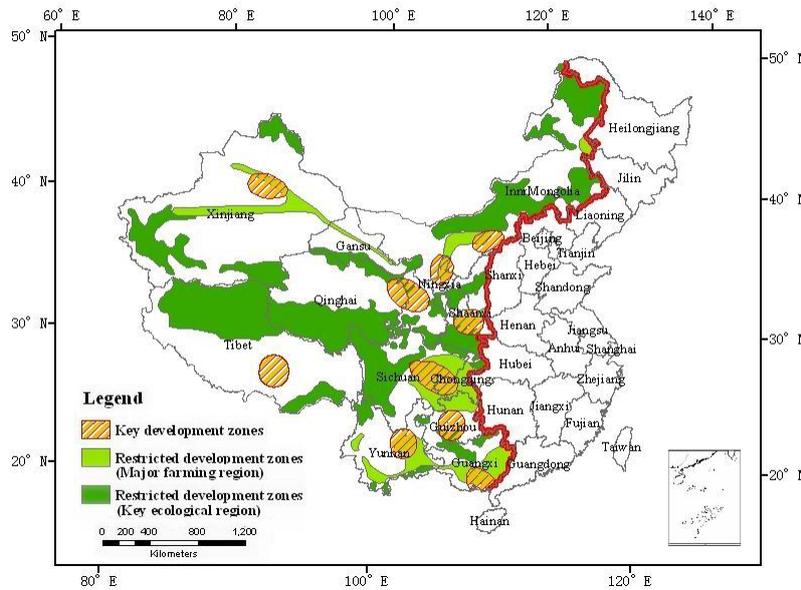
⁷⁰ Asian Development Bank. *Toward an Environmentally Sustainable Future---Country Environmental Analysis of People's Republic of China*. Philippines, 2012, p.xvii

⁷¹ NBSC. *China Statistical Yearbook*, 2004 and 2011, Beijing

⁷² NDRC. *The People's Republic of China National Report on Sustainable Development*, 2012

⁷³ NDRC. *Outline of the Eleventh Five-year Plan for National Economic and Social Development of PRC*, People's Publishing House, 2006

Figure 4. Distribution of National Key Development Zones and Restricted Development Zones in Western China



Main Functional Zoning needs to be used effectively to inform and constrain all major new development decisions, and be well aligned with EIA and other planning.

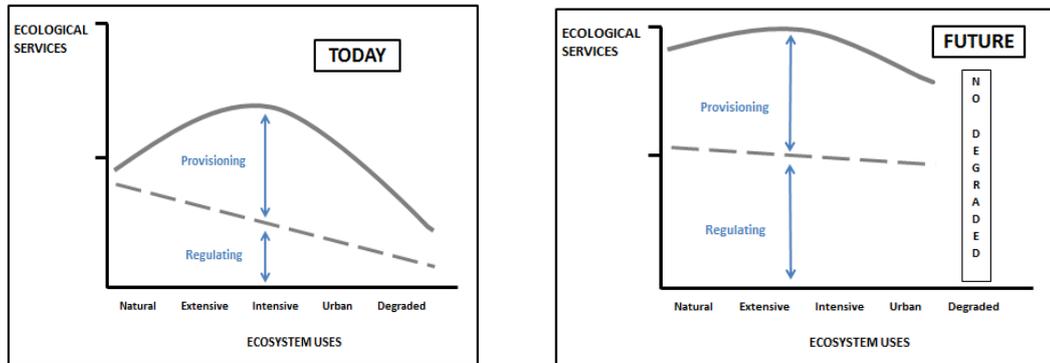
Table 2. Four Main Functional Zones in China

Zones	Features	Development Direction
Optimized Development Zone	Land exploitation intensity is already high and resource and environment bearing capacity starts to decline.	Prioritize improvement of quality and benefit of economic growth, enhance the level of participation in global distribution and competition, and maintain its role as the leader of national economic and social development
Key Development Zone	Resource and environment bearing capacity is relatively strong and economic and population concentration condition is relatively good.	Substantial infrastructure construction, improve investment and business establishment, promote development of industrial clusters, enlarge economic scale, accelerate industrialization and urbanization, undertake the industrial transfer from optimized development zone and the population transfer from restricted development zone and prohibited development zone, and gradually become the important carrier to support national economic development and high population density.
Restricted Development Zone	Resource and environment bearing capacity is relatively weak and large-scale concentrated economic and population condition is not good enough. The zone is related to ecological safety in the country or greater region.	Adhere to protection priority, moderate development, point development, rely on local conditions to develop characteristic industry supported by resource and environment, strengthen ecological restoration and environmental protection, guide over-concentrated population to orderly transfer and gradually become a national or regional important ecological functional zone.
Prohibited Development Zone	Various natural reserve areas	Carry out compulsory protection, prevent interference of human factors with natural ecology and prohibit exploitation activities not

		conforming to the principal function of the zone.
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Underlying all this is the need to understand the importance of ecosystem services for meeting both provisioning and regulating functions (see Figure 5). In effect more economic goods will be demanded of ecosystems (*provisioning*) while ecological goods such as natural cleansing of water and flood control (*regulating*) also must be enhanced from these same ecosystems, a major dilemma in decision-making.

Figure 5. Ecological Provisioning and Regulating Services for China.



Source: Modified and further interpreted from CCICED Ecosystem Task Force scenario modeling.

Opportunities

Nature-based and cultural tourism such as in and around Chengdu and Central Yunnan is a fast-growing business that employs many local people and helps develop capacity. It depends on protection and planning of natural (and cultural) features and areas in a collaborative way to engage and empower local peoples. Elsewhere, businesses in urban areas are using natural products, such as in Xining, where wool and plants from grasslands are turned into carpets and medicines in factories employing “migrants” from rural communities. However, in both examples there is the potential for “green pollution” from resource overuse and from factory wastes.

Future development in the western region depends on improved governance and efficiency in water use and pollution control in urban areas, agriculture, industry and in power production (especially for new shale gas resources). Overcoming the challenge does present opportunities for green industrial development and human development (for example, innovation and investment in environmental technologies in Chengdu and surrounding areas). Experience in similar conditions elsewhere (in Australia, western United States and Canada) demonstrates a pathway from a situation of constraint and crisis towards one of expansion and potential (see Box 2), but with considerable adjustments in institutional mechanisms.

Box 2. Adjusting water management and allocation decisions involving national and state/territory governments – an Australian case example⁷⁴

Challenge

Managing supply and demand for a scarce resource which crosses state boundaries in an efficient, equitable and sustainable way.

Context

- Water has been a major factor in determining mining, agricultural and urban growth
- Responsibility vested in state/territory governments that are responsible for managing water resources to yield public and private benefits.
- History of conflicts between governments about planning and allocation (conflict between upstream and downstream) and about data objectivity and transparency.

Change in practice

- National government's role progressively increased. Council of Australian Governments developed a national water reform framework with national goals and actions for water to support resilient and viable communities, healthy ecosystems and economic development.
- All governments agreed to be independently assessed on progress of water planning.
- National Water Act 2007 introduced with a key reform—having an independent authority set sustainable diversion limits across the Murray Darling Basin, replacing consensus.
- Collection of reliable and transparently reported water data by a trusted, independent statutory agency, the Bureau of Meteorology, rather than on a jurisdictional basis.
- Robust planning applied within a broader management system incorporating appropriate regulation and effective market structures, including the establishment of property rights and a national water market. Statutory water plans used as the vehicle to provide security to all water users through clearly defined entitlements to a share of water.
- Responsibility for “environmental water” vested in environmental portfolios in many jurisdictions rather than natural resource or agricultural agencies.
- Water planning based on a participatory/advisory process that allows for community input to government decision-making in water management.

Lessons Learned

- Invest in establishing objective data sources and identify an independent data custodian.
- Data and modeling are critical and needs to be accepted by all concerned.
- Jurisdictions must be able to develop planning frameworks that reflect jurisdictional diversities to drive innovation and jurisdictional engagement.
- Use a suite of tools to achieve efficient and sustainable water management.
- Engage communities in both the assessment and decision-making processes relating to changes in water management regimes and the potential need for government assistance to affected communities in addition to direct water users.
- Cooperative arrangements between the governments that manage an interconnected system break down with economic growth pressures (e.g. as water demand exceeds supply) and start to undermine the key sustainability of *all* uses of the rivers in the long term. A central authority is required, although one that can work with the states. A coalition of the willing is the best way to implement a central water plan.

The critical work for the central authority is to define the objectives in water planning and to assist in identifying trade-offs for governments based on reliable and objective information.

3.2 Improving labor force quality and diversity for poverty alleviation

Current status

Poverty in Western China is especially dominant among poorly educated people, many of whom have an ethnic minority background, living marginally above

⁷⁴ Australian Government. *National Water Commission Report Card 2011*

subsistence level in rural areas characterized by poor soils, vulnerable ecosystems, unpredictable climatic conditions, and poor access to markets, schools, health and agricultural extension services. As a consequence, their educational levels are low and their physical capacity to engage in the “new green economy” is limited. Many such people, labeled as floating urban populations, migrate to urban areas and remain poor.

Challenges

The Government of China has undertaken many initiatives to address these problems, e.g. significant progress towards Millennium Development Goals⁷⁵, and many of which continue today. However, there are many social, economic and environmental challenges that reduce the effectiveness of existing measures. Some western regions have a fragile ecological environment with development banned or restricted under the Main Functional Zoning system. Extensive cultivation by farmers and expansion of grazing areas by herdsmen was interrupted by introduction of development limits on arable land and pastures. Environmental factors to a certain extent limit some economic benefits of local industrial development. Thus in ecological protection zones, residents with no other source of livelihood become the “green poor”.⁷⁶

Opportunities

Opportunities exist to reduce poverty in Western China by combining a set of actions addressing the above-mentioned constraints and creating jobs associated with environmental services, tourism and other green industry based on local characteristics, while also explicitly respecting endangered ethnic minority cultural values, and facilitating the smooth integration of these vulnerable minority groups into a rapidly changing modern society.

Towns and villages characterized by poverty need broad-based education opportunities at elementary and secondary schools, and specialized vocational and academic education at a cost and in locations that local people can afford to take advantage of. Due to language and cultural barriers, training and educational programs must be planned with sufficient duration and patience so that drop-out rates are reduced to the national average. This challenge must be explicitly expressed in curricula that maintain local language proficiency along with fluency in Mandarin, which is a necessary condition for being able to compete for better-paid jobs.

⁷⁵ Ministry of Foreign Affairs of the People’s Republic of China, 2010. *China’s Progress towards the Millennium Development Goals 2010 Report*

⁷⁶ http://www.gmw.cn/sixiang/2012-03/25/content_3832145.htm

Efforts to enhance human capital should focus on how to cope with natural (soil, water, climate, etc.) constraints and opportunities, and strive to improve basic sanitation in these vulnerable areas. To facilitate this human capital enhancement program to a sustainable level, key physical infrastructure upgrading must accompany the human and institutional capital upgrading. There needs to be all-year road access to markets, credit institutions, insurance and public amenities. Teachers, extension workers and public health personnel must be able to reach towns and villages, so adequate roads must be built, with a program for their maintenance. The relevant authorities must commit to an accompanying budget. Such infrastructure provision needs to be coordinated with these other initiatives for human capital development.

3.3 Managing energy and mineral resources and pollution control

Western China is rich in coal, oil, natural gas and other energy resources and is the most crucial source of strategic energy and raw materials for China's industrialization and modernization. All 171 minerals discovered in China have been found in the western region; they display the full range of mineral resources; and the symbiotic and associated minerals are rich. The potential value of 45 major mineral reserves is up to 44.9 trillion *yuan*, accounting for 50.85 per cent of the total metal reserves in China. The reserves of some rare metals in Western China rank top in China, if not the world. The abundance in natural resources and reserves provides the region with significant advantages for development.⁷⁷

Table 3. National Proportion of Main Energy Reserves in Western China

Minerals	Proportion of the national total reserves (%)	Minerals	Proportion of the national total reserves (%)
Pyrite	40.5	Kaolin	29.9
Coal	46.8	Trona	96.0
Bauxite	54.6	Magnesite	0.1
Oil	14.1	Asbestos	96.9
Manganese	60.9	Primary ilmenite	97.5
Natural Gas	61.5	Phosphorus	52.1
Copper	29.3	Vanadium	75.5
Water	54.1	Iodine	92.5
Chromium	48.8	Iron	27.8
Titanium	96.7	Mirabilite	83.8
Mica	85.2	Lead	65.2
Zinc	76.1	Nickel	88.0
Mercury	91.0	Fluorspar	63.3
Rock Salt	77.1	Potassium	99.3

Source: *China Statistical Yearbook 2010*.

⁷⁷ Xiuping Zhang, Lingqun Ma, Manqi Ke. *Status of Mineral Resources in China's Western Region – Problems and Countermeasures* (in Chinese). Northern Economy, 2010 (2): 37-39

Current status

During the past few decades, exploitation of mineral resources and energy sources have played an important role in promoting the economic development of the whole country, especially Eastern China. Current problems in resources exploitation in the western region include large numbers of small-scale mines, dislocated resource production and consumption, and environmental pollution from mining.

At the same time, currently there is insufficient exploration of resources in Western China due to the low per-capita value of various resources, quality disparities, spatial distribution, poor mining condition and insufficient investment in exploration. Physical access is difficult in many areas, compounded by restricted availability of water and energy resources, due to competition with the dominant hydropower industry. Distance from markets, harsh natural conditions and inadequate supporting infrastructure have collectively meant that despite W. China's natural mineral advantages, these have failed to translate into economic or community gains. Overall development and utilization levels are not high, many mineral resource reserves have yet to be accessed due to insufficient investment in exploration, and mining enterprises face serious problems relating to poor facilities, poor management, destruction and waste of resources and environmental pollution.

Existing challenges

The challenges are linked to both accessing these resources and constraints related to natural resource scarcity, financial, infrastructure and technology matters, but also to the potentially negative impact of their extraction on ecosystems and the health and wellbeing of communities if managed poorly. The recovery rate of major minerals is generally only 30 to 50 per cent, and is 10 to 20 per cent lower in W. China than the national average. There has been a history of small mine development in the region. Due to the lack of environmental awareness and appropriate constraints, serious ecological and environmental problems have arisen due to unfettered exploitation of mineral resources causing significant community unrest and damaging the reputation of the industry both nationally and internationally. The western region has an average altitude of over 1000 meters, a fragile ecological environment, large areas of desertification, and is more vulnerable to predictable and unpredictable disasters and loss of human life associated with excessive resource exploitation. More than 70 per cent of sudden geological disasters occur in the western region. Many mining areas are in multi-ethnic districts and are subject to cross-border

environmental problems and social issues relating to national unity, safety, stability and sometimes lack of benefits accruing to local communities.

Opportunities

Opportunities for Western China can be summarized as follows: (a) Through the implementation of the China Western Development Strategy and other relevant policies, special advantages have been offered to mining enterprises in Western China and deliberate action taken to reduce the number of small polluting mines. Significant benefits can flow with the further consolidation of small-scale mines to increase efficiency and reduce environmental damage, noting that they produce over half of China's mineral production. (b) A number of potentially beneficial policy and taxation initiatives are being developed but these need to be implemented more quickly to ensure that resource rents reflect environmental and other costs and stimulate local investment and innovation and promote investment in green technology and community development. (c) There is a need to more explicitly take into account broader health and socio-economic benefits and risks to communities in land use planning and decision-making and provide opportunities for public input. The government has recently announced yet to be implemented changes in this regard. (d) Current policies relating to resources tax require further adjustment. The mechanism for assessing resource development and use is imperfect and the income distribution policy of resources revenues is unclear and is currently not meeting its intended outcomes. Resource taxes are low, while in a resource-rich region, the income of local residents have not proportionally benefited. Decree of the State Council of the People's Republic of China No. 605⁷⁸ supports a policy to steadily promote reform in resource taxes and fees, mainly to increase the rates on standard coal, oil and natural gas, with price-based approach applied for oil and gas. However, the actual implementation of this policy has not yet been evaluated. (e) Natural resource use and decision-making frameworks and information bases should be strengthened. There needs to be site-specific and regionally focused EIAs which have the capacity to address cross-border issues. (f) There needs to be more appropriate cost recovery mechanisms to address mine remediation issues and a comparatively low number of mine sites are currently being remediated. This could include expansion of initiatives such as the guarantee fund to create a more comprehensive green development fund to provide a sustainable source of funds for provincial and local governments to remediate dirty mine sites.

⁷⁸ Decree of the State Council of the People's Republic of China No. 605, *The decision of the State Council on revising "the Provisional Regulations on Resource Tax of People's Republic of China"*, 2011.

Box 3. Sustainable mining in Australia⁷⁹

As in Western China, the mining sector is a key contributor to the Australian economy. However, mining companies are acutely aware that the old models of corporate responsibility, which were based on the aim of generating the greatest possible profit for shareholders, are now changing and the broader issues of wealth distribution, community development, environmental protection, health and education and human rights are no longer able to be viewed as just the business of governments.

Sustainable development is directly linked to commercial sense, and it is fundamental to the mining sector attaining and maintaining integrity and credibility, in order to obtain permission from the community and government to continue to mine. In other words, the concept of sustainable development should underpin the nature of the interaction between the government, the community and industry as partners in the development of mining and other resources.

In Australia, the shift has seen the adoption of sustainable development programs. The Australian mining industry is well aligned to the global pursuit of sustainable development. Under the umbrella of “Enduring Value” and the former Ministerial Council on Mineral and Petroleum Resources’ strategic vision, the mining sector has been collaborating with government and community representatives to produce the Leading Practice Sustainable Development Program for the Mining Industry.

The Leading Practice Program provides practical guidance on sustainable development issues relevant to the mining industry through handbooks and workshops to assist implementation of leading practice and the shift towards sustainable development. Workshops based on sustainable development themes were conducted and handbooks used to promote leading practice sustainable development in regional and international forums; for example, a workshop on “Stewardship – Life Cycle Partnerships” was held in Beijing in November 2007.

Traditionally, environmental impact assessment is applied at project (site) level, with little or no consideration of cumulative effects over the long term and at a regional scale. This would result in the situation where an individual project is always justified, while the overall cumulative impacts often lead to environmental pollution and degradation at the regional level. Strategic Environment Assessment (SEA) is, on the other hand, a tool to identify and prepare for the potential cumulative effects upfront, so that large-scale irreversible adverse impacts can be avoided and minimized effectively. It is an analytical and participatory approach to strategic decision-making that aims to integrate environmental considerations into policies, plans and programs and evaluate their linkages to economic and social considerations. A growing number of countries, including Australia, have legislation or regulations prescribing the application of SEA. This is also of particular importance for W. China, where large-scale industrialization, urbanization and resource development are emerging.

In summary, the opportunities for green development in the mining industry require the coordinated application of a range of financial, policy and regulatory and market measures to support and provided incentives for a more acceptable type of mining development and offer direct benefits to the community, province and the nation as a whole. This approach seeks to shift the emphasis away from using government funds to fix environmental problems to supporting an industry that is demonstrably committed to broad sustainability principles. Government needs to be more prescriptive in what type of development it is prepared to encourage in this area and place greater onus on developers to behave in accordance with these standards.

⁷⁹ The Department of Resources, Energy and Tourism, Australian Government, *Social Responsibility in the Mining and Metal Sector in Developing Countries*
<http://www.ret.gov.au/resources/Documents/LPSDP/DEPRES.pdf>

3.4 Promoting green and inclusive industrial development

Although major inequities persist, some progress has occurred on narrowing the gap between eastern and western China through industrial development.

Current status

From 2000 to 2010, the industrial value of W. China increased by 20.12 per cent each year, which is 2.90 per cent higher than the national average, 3.82 per cent higher than Eastern China, and 2.19 per cent higher than Central China. In addition, the ratio of industrial added value to regional GDP in W. China had increased from 33.94 per cent to 42.19 per cent, with industry playing a more important role in the economic development of W. China.⁸⁰

While State Council policies and targeted infrastructure programs have promoted the shift of industries from east to west, there are significant concerns regarding the need to ensure effective policies and management instruments are in place to avoid the region becoming an unquestioning recipient of polluting industries from other regions.

Existing challenges

Challenges relate to: (a) dominance of capital rather than labour-intensive enterprises, providing very few employment opportunities; (b) high proportion of state-owned enterprises and low proportion of small and medium sized private enterprises resulting in a shortage of dynamic markets and high barriers to entry for local enterprises; (c) high proportion of resource exploiting heavy industries and low proportion of processing and manufacturing industries, resulting in high pollution emissions and significant environmental costs. In 2009, the proportion of energy/chemical industry and mineral development industry in the region's total industrial output was 63.41 per cent, 17.18 per cent higher than the national average. The proportion of the equipment manufacturing industry in the region's total output was 16.91 per cent, 7.69 per cent lower than the national average. Industry is in a highly resource-dependent stage, mainly relying on launching new projects and enlarging the production scale, which leads to low socio-economic benefits and high environmental resource consumption. For example, the industrial energy consumption

⁸⁰ NBSC. *China Statistical Yearbook*, 2001 and 2011, Beijing

per unit of value added is 1.09 times of the national average and industrial waste water discharged per unit of value added is 1.08 times the national average.⁸¹

Opportunities

The opportunity lies in the promotion of rapid green industrial development. Western China represents an important potential domestic market and may potentially assist in minimizing China's reliance on its export industry during globally difficult times. Due to the low level of existing industrial development, fewer employment opportunities and many low- and middle-income residents, the region currently has relatively sluggish consumer demand. Green development provides opportunities to address disparities and optimize potential for economic, human and environmental "capitals".

This can be achieved by the expansion of a number of existing and new initiatives. For example: (a) introducing and fostering leading enterprises and industries and actively supporting small and medium enterprises including the more sustainable use of natural resources; (b) developing specialized and competitive agriculture, including improving agricultural efficiency, rural incomes and addressing concerns of food and ecological security; (c) developing the equipment manufacturing industry, acknowledging its potential to speed up and transform industrialization; and (d) supporting the development of people-enriching industries through the use of tax policies, supporting small and growing industries, agriculture and tourism in order to take full advantage of the area's natural characteristics and strong green brand power.

To deal with these issues, some solutions have been proposed in the guidelines for western development in the new decade, issued in 2010. This includes giving full play to the region's advantages while giving priority to the energy industry, agriculture, mineral resources, deep processing industries, and modern manufacturing industry.

Most significant, however, is the need to fully utilise the human capital of Western China and improve the quality of the labour force and the overall access and quality of education and vocational training. The ageing of the population will affect workforce supply and officials and industry leaders have predicted emerging workforce shortages. Greater emphasis is required on strengthening professional training, especially secondary vocational training of practical use for local people.

⁸¹ NBSC. *China Statistical Yearbook*, 2011, Beijing

A transformational change is required in the nature of industry being supported by government to operate in or relocate to Western China. A combination of market mechanisms, including appropriate pricing of natural resources; fiscal programs; and stricter regulatory and compliance mechanisms will be required. Green development funds have been effectively used internationally to assist industrial transformation, especially in towns and cities that are highly resource dependent. There are also opportunities to further promote potential industrial advantages of the western region by strengthening key areas of technological innovation, promoting environmental technology applications and by accelerating the development of a low carbon economy. These efforts will lead to transformational benefits for industry and a greater degree of environmental control and ecological protection.

Industry must be provided with efficient and outcome-oriented regulatory and compliance structures to underpin green entry criteria for development in Western China (see Box 4). Opportunities may also be explored to enable local communities to be reimbursed for participating in environmental monitoring programs.

Box 4. Potential Green Entry Standards & Criteria

Green entry standards or criteria should align with national and provincial green development targets. They must reflect the unique characteristics of the province.

They can include any or all of the following:

- Requirements to evaluate site specific and broader regional impacts and ensure appropriate mitigation strategies
- Strengthen the cost accounting and environmental threat recognition
- Stipulate acceptable emission levels
- Stipulate energy and natural resource use efficiency requirements including effective demand and supply analysis
- Stipulate recycling requirements
- Outline monitoring, auditing and public transparency requirements
- Identify biodiversity or habitat protection measures
- Require social impact appraisals and identify necessary social responsibility requirements relating to health, education, employment and infrastructure
- Stipulate workplace safety requirements

3.5 Promoting sustainable urbanization

Western China has played a critical supporting role for economic advancement in China over previous decades, by providing cheap labor and abundant natural resources, but it is now time to reap some returns.⁸² The level of urbanization can be an indicator of social economic development of a region or nation, and a relative high

⁸² Liu, G., Y. Chen, et al.. *China's environmental challenges going rural and west*, Environment and Planning, 2012, A 44 (7): 1657-1660

urbanization level are quite often linked with higher levels of income, education, and job opportunities. Research shows a strong correlation between urbanization and economic growth and between urbanization level and per capita income.⁸³ In Western China, a historical trend shows a very strong correlation between the urbanization level and per capita GDP (Figure 6). Recent research shows there are positive correlations between urban growth and economic development in cities, with spillover effects in surrounding regions.⁸⁴ Thus, urbanization and associated changes can become a powerful driving force for socio-economic development, and provide an opportunity for poverty alleviation and human development.

In addition, urbanization has the potential to relieve eco-environmental pressures of population in Western China, both directly and indirectly. Population pressure on sensitive ecosystems through inappropriate and excessive use has been cited as the most powerful agent of ecosystem degradation in Western China,^{85,86,87} and reducing such pressure often becomes the most important task for the many ecological protection programs.⁸⁸ Cities can provide alternative forms of settlement, education and job opportunities, which can reduce direct pressure on sensitive ecosystems. Indirectly, cities can be more environmentally friendly than rural living. Given the same income level, cities show higher per capita environmental efficiency than their rural counterparts,⁸⁹ often due to their much higher density and efficiency of scale. Urbanization will inevitably increase the living standards of people and the resource and environmental impacts associated with income growth in Western China, in the long run, can be a more sustainable habitat form.

⁸³ Bloom, D. E., D. Canning, et al.. *Urbanization and the Wealth of Nations*, Science, 2008, 319(5864): 772-775

⁸⁴ Bai, X., J. Chen, et al. *Landscape urbanization and economic growth in China: Positive feedbacks and sustainability dilemmas*, Environmental Science and Technology, 2012, 46(1): 132-139

⁸⁵ Jun, W.. *Land degradation and ecological rehabilitation in karst areas of Guizhou province, South Western China*, Advances in Earth Science, 2003, 18(3): 447-453

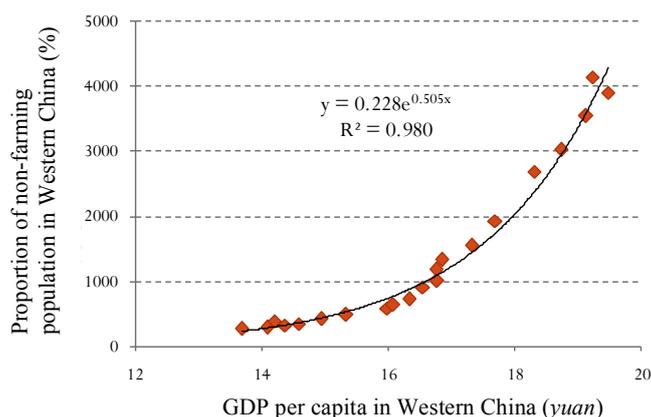
⁸⁶ Liu, J. and J. Diamond. *China's environment in a globalizing world*, Nature, 2005, 435 (7046): 1179-1186

⁸⁷ An, S., H. Li, et al. *China's natural wetlands: past problems, current status, and future challenges*, AMBIO: A Journal of the Human Environment, 2007, 36 (4): 335-342

⁸⁸ Liu, J., S. Li, et al. *Ecological and socio-economic effects of China's policies for ecosystem services*, Proceedings of the National Academy of Sciences, 2008, 105 (28): 9477

⁸⁹ Brown, M. A., A. Sarzynski and F. Southworth. *Shrinking the carbon footprint of metropolitan America*. Washington DC, Brookings Institute, 2008

Figure 6. Urban Population Share and GDP per capita in Western China



Data Source: *China Statistical Yearbook*

Therefore, urbanization done well can improve all of the four “capitals”. It can serve as a powerful agent of change, as the urbanization process requires infrastructure development such as transportation systems and urban environmental infrastructure, accompanies industrial development, and brings about changing lifestyles and consumption behavior of local people. But it is not without risk, and careful attention needs to be paid to the special features in W. China. It is important to note that promoting urbanization in Western China should not aim to attract large-scale migration from outside the region, which was the case in eastern coastal regions, and probably in most other developed countries. Neither should it be about simply enhancing the urbanization level in the region. Rather, it should be promoted as an agent to provide an environmental and socially sustainable habitat form, that: (a) provides support for western development via attracting and retaining a high-quality labor force; (b) reduces population pressures on the ecosystem and environment; and (c) provides a platform for economic development and poverty alleviation. In other words, urbanization in Western China needs to be viewed and utilized as an agent for real, positive change to support the overall green development goal in the region.

Current status

In relation to urbanization, Western China can be characterized as having:

An overall low urbanization level, but increasing rapidly, and with a strong spatial variety. By the end of 2010, the level of urbanization in Western China was 40.48 per cent, 7.02 percentage points lower than the national average, 7.2 percentage points lower than Central China, and 17.32 percentage points lower than Eastern China. Among Western provinces, the urbanization level varies greatly. At the end of 2010, the urbanization level of Inner Mongolia was 53.4 per cent, the highest among

the western provinces, while the level of Tibet was just 23.8 per cent, which was the lowest among western provinces. The urbanization level gap between Inner Mongolia and Tibet was as wide as 29.6 per cent.

Few urbanized areas, with small size and low density. As of 2010, Western China had a total urban area of 36,719.3 km², 0.53 per cent of the total regional area, compared with 2.67 per cent and 6.63 per cent in Central and Eastern China respectively. Within the urban area in Western China, there are 85 cities at prefecture level and above. The average size of cities at prefecture level in the western region, 431.99 km², is almost half the average in eastern cities of 946.97 km².

A relatively weak growth engine function of cities. Many cities in Western China have a similar industrial make-up, with energy, metallurgy and chemical industries occupying the top five major industries. This often leads to over-competition among cities in the region. In 2009, the ratio of GDP in central city areas in the total GDP of the whole city was 55.3 per cent on average among western cities, while the same ratio among eastern cities was 62.5 per cent, which illustrates the lower economic growth of cities in Western China.⁹⁰

Few cities have fully fledged urban function and enough attraction to retain high-end human capital. In Guizhou Province, for example, there 111 graduates with masters or doctorate degrees and 604 skilled workers moved into the region from 1995 to 2000, while the number of well-educated people with masters or doctorate degrees and skilled workers moving out of the region was 147 and 1738 respectively.

Key constraints/challenges

Five key constraints and/or contextual issues need to be kept in mind when promoting urbanization in the western region: (a) The region has a **fragile ecosystem** that provides vital ecosystem services to the rest of the country. Under the Main Functional Zoning, designated protected or limited development areas will limit the type and pathway of urbanization. (b) The **shortage of some key resources**, such as water already is a strong constraint in some W. China cities. In 2010, the per capita water supply in western cities at prefecture level and above was 24.11 tons, less than half of eastern cities, at 49.33 tons. (c) **The geographical location** of the region, which is land locked and far away from the coastlines that play a central role in terms of economic development and urbanization. (d) The region has a **relatively low**

⁹⁰ NBSC. Research Report on the balanced development and the overall strength among cities in China, Beijing, 2011

starting point, in terms of relatively weak industrial basis, and insufficient hard and soft urban infrastructure. Although there are some exceptions such as Chongqing and Chengdu, local industries in western cities are relatively weak and underdeveloped. and (5) The region has a **rich and diverse cultural background**, with 55 ethnic minority groups. Given that urbanization often entails changes in habitat form and associated lifestyle, such cultural diversity can be a constraint in one-size-fits-all kind of urbanization, but at the same time can be a wonderful opportunity to develop vibrant, culturally harmonious cities. Urbanization should be promoted with due respect to this unique natural, economic, and social situation of the region.

Box 5. Eco-city Development in Western China⁹¹

The concept of Eco-city means a city designed with consideration of environmental impact, inhabited by people dedicated to minimization of required inputs of energy, water and food, and waste output of heat, air pollution, and water pollution, also “low-carbon”. Eco-city construction in China started in 1986 with the goal of building an eco-city in Yichun, Jiangxi province. By February 2011, among 287 prefectural-level cities in China, 259 cities declared their goal of building eco-city (or low-carbon city). Tianjin Eco-city is a fascinating 30 km² development designed to showcase the best new green technologies and to serve as a model for future developing Chinese cities.⁹²

Influenced by the national trend on building Eco-city, governments in Western China also are active in promoting the construction of eco-cities. A number of eco-city efforts have been advocated in the western region recently, such as Beichuan County, characterized by low-carbon and post-disaster reconstruction; Turpan, characterized by an eco-city appraisal index system, saving water and energy, ecological protection and historical culture reserve; Chenggong County, characterized by effective urban land use, low-carbon urban planning and urban ecosystems.

Unique opportunities

Western China has unique opportunities in terms of promoting urbanization. First, the central government’s determination to develop the region can be the “wind under the wing” for the region, as high-level political attention and well-designed and coordinated government policy can provide a favorable environment and window of opportunity for sustainable urban development. Second, the relatively low current level of urbanization means there is little “minus” or historical legacy and associated need to retrofit, which can be costly. It also means there is an opportunity to embrace state-of-the-art sustainable development concepts, technologies and practices, including building codes, infrastructure, planning approaches, public transportation systems, low-carbon and eco-city building, taking the construction of the eco-city in Western China as an example (see Box 5). Third, some important strengths and advantages are under-explored: for example, the area’s natural beauty, for building

⁹¹ Annual Report of the project of *the Construction of the Eco-city Appraisal Index System and the Evaluation on Typical Eco-city*, Chinese Society for Urban Studies

⁹² http://www.huffingtonpost.com/2011/01/13/tianjin-eco-city_n_806972.html#s221860

tourist-industry based cities; border regions, for developing small but vibrant trade towns and cities; cities and towns linked with resource and mining industries. Fourth, as urban air and water pollution in eastern cities generates increasing concerns, relatively clean air and water in some secondary cities in the western region can be attractive to well-educated “human capital”.

Box 6. “Five Golden Flowers”, a rural-urban integrative development in Sansheng County, Jingjiang District, Chengdu⁹³

To break up the dual structures of urban and rural areas and improve the rural environment, the government of Chengdu has invested in five villages in Sansheng county since 2003 to build five tailored eco-tourism areas. These projects not only make full use of geographical location advantages but also fit well with current urban residents’ desire to experience rural life. Initiatives have been undertaken through joint investment by the local government and farmers, land transaction, industrial support and institutional guarantees. The Huaxiangnongju project features bonsai, cut flower and tourism industries; Xinfumeilin has plum flower culture and industry; Jiangjiacaidi transformed traditional planting into a new venture; Donglijuyuan focused on cultivating chrysanthemum and its relative industries; and Hetangyuese built an art village. In 2006, these eco-tourism areas, labeled the “Five Golden Flowers”, were included among the national AAAA grade scenic spots.



Before 2003, Sansheng was among the poorest suburban counties of Chengdu, but because of the construction of the “Five Golden Flowers”, the socio-economic situation of these five villages has improved significantly. From 2002-2006, the total tax revenue increased from 0.5 million *yuan* in 2002 to 12 million *yuan* in 2006, rural net income increased from 3500 *yuan* in 2002 to 8015 *yuan* in 2006, while the average land price of surrounding areas increased from 0.5 million *yuan* per *mu* to 3.5 million *yuan* per *mu*.⁹⁴ This successful experience shows how citizens’ lives can be transformed without land grabs, demolitions and moving people’s houses.

3.6 Institutional and policy settings as facilitator and driver

Effective policy guidance and institutional arrangements are essential to make the urgent changes required to achieve a green development outcome.

⁹³ http://www.sdpc.gov.cn/tzgg/zhptggsd/t20070619_142124.htm

⁹⁴ Chengdu Municipal Government. *The Report on the urban-rural integrative development in Jingjiang District, Wenjiang District and Shuangliu County* (in Chinese), 2007

Current status

The current situation with regard to green development policy has been described as chaotic. Although many well-intentioned and effective initiatives exist, others interact to produce unexpected, counter-active, sub-optimal or even unproductive results.

Key constraints/challenges

In order to achieve a cohesive green development approach and outcomes in Western China it is necessary to transform the development model, to make integrated changes in national and provincial policy and practices, and to ensure real enforcement of regulatory frameworks. For example this requires a shift to increased coordination. Central government ministries and programs now interact sporadically. Financial support is significant (estimated to exceed \$US90 billion nationally in 2009),⁹⁵ but funding is often short-term, project and issue-driven, with complex and specific eligibility rules that present formidable hurdles for poor, remote communities lacking human resource capacity. It also requires market mechanisms to incentivize investment in, for example, pollution prevention and ecosystem restoration and appropriate pricing of natural resources

Cautiously gearing towards the development target “Two Higher” This target, set in the 12th FYP for Western Development, creates contradictions. However, 77 per cent of the western region is in zones that are “development restricted” or “forbidden” under the National Main Functional Zoning Large-scale, high-intensity industrialization and urbanization activities are limited in “restricted” areas, and any kind of industrialization and urbanization development is prohibited in “forbidden” areas. The pressure to achieve socio-economic development objectives requiring higher than average economic and income growth rates places great pressure on local officials to enable development that may conflict with the Main Functional Zoning intent. Guidance is required on how to reconcile the incompatible targets, and improvements to the Main Functional Zoning approach.

Weak policy monitoring mechanism The current western development system is still a “top-down” management system, reflecting traditional Chinese practice. The China Western Development Strategy was established by the State Council in January

⁹⁵ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012,p.81

2000, with Premier Zhu Rongji as team leader of the leading group and Vice-Premier Wen Jiabao as deputy head. Local government departments set up specialized agencies within the National Development and Reform Commission (NDRC) system; relevant departments added units to support the West Development Strategy; and the National Natural Science Foundation Committee also directed talent and funds to support the program. This “top-down” management system probably led to regulation failures since not all departments involved are effectively connected with each other.

Added to these issues are the challenges of: inadequate, inaccurate or misleading information to enable adequate policy analysis;⁹⁶ a lack of mechanisms to effectively engage citizens in the involved communities; and a revenue-and-rewards system for local government officials that drive them to make short-term decisions that will improve GDP results.

Imperfect financial and fiscal mechanisms Since the implementation of the Western Development Strategy, central government funding for Western China was directed by a series of state policies. A large amount of this financial assistance was provided through direct investment, transfer payments, ecological protection and construction projects, and tax preferences. These financial priorities played an active role in promoting growth, increasing tax revenues at the regional level, creating and offering job opportunities, and accelerating industrial restructuring. However, problems in current financial arrangements hinder potential green development:

- The amount of financial support is not matched to the level of responsibility for environment protection, meaning regions taking more responsibility for environmental protection did not get greater correspondingly larger amounts of funding from central government. This problem is undoubtedly the main cause of the difficulty identifying responsibilities for ecological system protection.
- The transfer payment system aimed at balancing regional financial levels has not been fully established.
- Preferential tax policies need to be further perfected, in particular concerning: (a) Current preferential tax policy only covers a small range of industries. In addition, the tax exemption threshold is too high, which does not benefit many enterprises. (b) Preferential tax policy does not really support the industries currently encouraged by government (there is a list of industries to be encouraged in China). (c) Preferential tax, as a double-edged sword, can also lead to revenue loss for local government, causing fiscal difficulties. (d) The tax revenue division between central and local government adopts a universal tax revenue ratio, which results in a situation where poor regions have less tax revenue, and thus get less money back from central government.

⁹⁶ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012

- A long-term and stable funding channel for western ecological protection and social development has not yet been set up, resulting in an important bottleneck restricting on-going development in Western China.
- Current policies relating to eco-compensation are poorly articulated and need to progress from concept to implementation.
- Access to natural resources needs to be based on appropriate pricing policies and encourage efficient resource use by both government and private operators.

Opportunities

The distinctive characteristics of the western region need to be reflected in its institutions. The human and natural capacity limits that are not well recognized in national programs should be addressed. Poverty eradication can be achieved by expanding the focus away from short-term solutions that mainly favor GDP enhancement, which not only may not resolve many of the underlying cultural and environmental issues and drivers, but may actually further worsen the situation. Programs to improve accessibility and healthcare can be better coordinated with those aimed at loss of biodiversity and increased water supply and waste disposal issues (to avoid the experience such as in Qinghai Province, where the Task Force visited a new hospital that had no water and few services). There is a need to adapt to the cultural, language and other needs of distinct minorities living in poor communities.

The impact of significant financial transfer payments on the opportunities to secure progress in environmental management and development of green business made under the 11th and 12th FYPs could be greatly enhanced by an effective eco-compensation program transferring benefits directly to rural residents in a predictable way. The NDRC *“has been made responsible for developing a national ‘eco-compensation’ policy framework, and it is expected that the 12th Five-Year Plan will incorporate this and possibly also a draft law”*, however, *“much work remains to be done... and leadership is required in working with lower level governments to develop pilots and eventually scale this up to landscape and regional levels”*.⁹⁷ The very critical Main Functional Zoning approach is not yet fully integrated either with the eco-compensation approach or with decisions by all levels of government.

The opportunities are significant. China has a long history of focusing on the west and there is a sophisticated and effective planning infrastructure with great potential to change. All officials the Task Force met are dedicated and focused. They

⁹⁷ Asian Development Bank. *Toward an Environmentally Sustainable Future---Country Environmental Analysis of People’s Republic of China*. Philippines, 2012, p.121-122

need a well-articulated, integrated, consistent and strategic framework within which to work.

Box 7. International case: Zoning and land use planning to improve decision making for prosperity and environmental services, British Columbia, Canada⁹⁸

Challenge

To make timely decisions while improving the outcomes, consistency, predictability and public acceptability of the resulting resource management and development actions.

Context

- An economy dependent on resources (energy, mines, forests, agriculture) and high-quality environmental services (water, biodiversity) for enabling societal wealth and prosperity.
- Great geographical diversity and very high-quality natural resources facing increasing capacity pressures.
- A history of conflict over decisions.
- Increasing societal pressure for timely decisions which enable resource development but protect environment.
- An increasingly complex and unpredictable decision context due to competing demands, the effects of globalization and the uncertain consequences of shifts like climate change.

Change in practice

- Integrated and improved science-based information systems and increased transparency.
- Extensive engagement of diverse interests (stakeholders) in decision-making and management.
- Development of comprehensive and intricate land use zoning system through public consultation.
- Environmental assessment involves full public disclosure and is a separate agency.
- Establishment of neutral and legal bodies to review and report on implementation activity.
- Full engagement of minority peoples as equal partners.

Lessons Learned

- Zoning systems have limitations in highly complex and diverse environments especially when faced with requirement for constant adjustment and adaptation to changing contexts.
- New decision-making tools and approaches evolved from the first stage of planning.
- Development of well-coordinated and integrated accountabilities among management agencies and officials is essential to delivering effective and responsive decisions.
- Improved, integrated and transparent information systems are essential.
- Sustaining social license approaches becomes equally important as formal legislation and policy structures.
- Cumulative effects tools and risk assessment approaches are required to inform most effective decision-making in public interest.
- The approach must be enabled to evolve and adjust to change.

Applicability to W. China:

This region faces many of the same challenges but at far greater level of complexity. China can learn from this provincial experience and avoid many years of false starts.

3.6 Summary

This is a highly complex region of inter-connected values and issues that require sophisticated management approaches. Despite significant investments and changes already undertaken, severe impacts on the natural environment are already being

⁹⁸ External Briefing Advice to British Columbia Government, Derek Thompson & Associates, 2012

experienced and some environmental services are at or near a point of severe ecological—and health-related disruptions. Nonetheless, there are also significant opportunities in this region of enormous natural resource wealth and cultural diversity. What is required is a well-articulated, integrated, consistent and strategic framework and approach involving all levels of government.

4 KEY FINDINGS AND ROADMAP FOR WESTERN CHINA

The Task Force has concluded that for China to advance its green development agenda in order to achieve the Five-Year Plan goals and objectives, a roadmap is required to help, guide, structure and demonstrate the overall directions over the next 20 years. We presents a case that such a roadmap is most urgently required first in Western China because of the risks incurred if green development is not achieved there, and because of the potential benefits if this approach is successful. Finally the Task Force has outlined a very initial set of ideas to demonstrate the possibilities of the approach and to enable further discussion.

4.1 What is a Roadmap for Green Development and why China needs one

The roadmap for green development is a simple structure intended to demonstrate the coalescence of wide-ranging initiatives, and to give them focus and direction. It will place the government-announced goals, the FYPs and the Green Development Framework outlined in Chapter 2 into a single cohesive green development strategy. The roadmap includes four components:

- A set of goals that set out the direction for green development.
- A set of principles that can guide work to achieve the goals.
- An integrated set of mechanisms that can deliver green development outcomes for all of the six policy areas.
- A monitoring and evaluation approach that enables informed adjustment to new information.

It is not a set of prescriptive policy directions. Rather, like any map it is a guide or framework by which to assess and review existing policies, governance and planning structures and to assist in the development of further policy initiatives.

Key finding 1: Green development will not be fully achieved until government adopts a national approach that integrates green development into a roadmap with the other long-term strategic and operational mechanisms.

Despite very significant commitments of financial and other resources and many substantial and positive changes, the rate of change toward improved environmental outcomes is too slow: “*While some improvements in several indicators are made each*

year, the situation in general is not yet under control, and it is unlikely that truly comprehensive improvements in ambient environmental quality will be achieved until 2030.”⁹⁹ The Task Force agrees with the ADB’s assessment that a “strategic shift in the approach to environmental management will be required”.¹⁰⁰

The Task Force considers this essential for the following reasons:

(a) *The Five-Year Plans lack a comprehensive and integrated articulation of a green development approach.* The Five-Year Plans clearly provide a major building block to a green development trajectory in Western China. However, they are not sufficient to fully achieve green development in Western China or China as a whole. Effective planning for green development requires guidance, as well as better tools to help officials resolve the fundamental contradictions between the current strategies and the new green approach in an integrated, practical and business-like manner. China needs a national green development strategy supported by a sustainable and appropriately coordinated investment plan at central and provincial levels (including Western China) that will deliver the goal of “balanced, coordinated and sustainable development”. Green development under existing policy settings and delivery mechanisms will be very difficult to implement, or at worst unachievable.

(b) *The scope of the targets needs to be more comprehensive to equally encompass all development goals and provide clarity on contrasting priorities.* The Task Force has concluded that the goals and targets in the 12th Five-Year Plan (see Box 8) are essential components of a green development approach for the nation and that those identified for Western China are also key components. As Box 9 demonstrates, these existing directions have been complemented over the past two years by further policy announcements and commitments of significant national funding and initiatives explicitly for Western China. But all such initiatives do not appear well integrated into a comprehensive framework that addresses the four fundamental goals of enhancing capital for green development.

Box 8. Goals set in the 12th Five-Year Plan for Western Regions¹⁰¹

Ecological environment: Forest coverage 19%, forest stock increase by 330 million m³, grassland ecological deterioration trend halted, soil erosion.

⁹⁹ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012, p.125

¹⁰⁰ Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People’s Republic of China*. Philippines, 2012, p.126

¹⁰¹ NDRC., *The 12th Five-Year Plan for Western Regions*, 2010

Eco-compensation: Establish eco-compensation fiscal transfer system from province to lower levels; study the establishment of deposit system for resource extraction industries; gradually establish inter-regional eco-compensation system; speed up research for eco-compensation regulation.

Energy saving and emission reduction: Strictly enforce the total emission control for main pollutants – energy consumption per unit of GDP in provinces of Western China other than Tibet to decrease by 15%, COD emission reduction by 4.5%, SO₂ by 3.5%, NH₃-N by 6.8%, NO_x by 3.4% compared with 2010; pilot circular economy and low-carbon areas/sectors; control the repeated construction of high-energy consumption and high-emission enterprises; phase out production capacity of resource-wasting, environmental-polluting and non-compliance with safety codes.

Disaster prevention and reduction: Establish direction system of monitoring, warning and emergency system in province-city-county-country level.

Economic development: Economic growth rate higher than national average; system of characteristic industry preliminary formed; inclusive development capacity improved significantly.

Standard of living improvement: Income growth rate for urban and rural residents higher than national average; urban economic house coverage over 20%; registered urban unemployment rate controlled lower than 5%; poverty population significantly reduced.

Public service enhanced: Gaps with national level gradually reduced in terms of compulsory education, medical care, cultural and social security; nine-year compulsory education sustained above 90%; urban and rural basic medical insurance participation increase by 3%; new rural pension and urban resident pension scheme achieve full coverage.

Infrastructure improvement: Comprehensive transport network preliminary formed; two-hour transit zones formed for key city clusters; paved roads access to townships and road access to villages basically achieved; additional 15,000km railway constructed; road transport and information communication facilities further improved; water conservation facilities enhanced; additional 120,000t/d municipal waste treatment capacity achieved.

Industrial structural optimization: Population for primary industry decreased, and comprehensive agricultural production capacity increased; secondary industry competitiveness greatly enhanced; tertiary industry greatly developed with increased employment opportunities; promote renewable and new energy sources.

Urbanization: Urbanization rate over 45%; enhance management to improve quality of urbanization.

Integrated urbanization and rural development: Enhance the leading and powerhouse function of central cities; nurture medium and small cities; speed up urban infrastructure construction; integrate urban and rural development.

The Task Force noted that the 12th FYP presents a number of contradictory directions, which officials have difficulty in resolving in the absence of effective mechanisms and processes to guide, monitor, assess and adapt decision-making. Thus progress will continue to be erratic and the goals for green development may not be achieved.

(c) Greatly improved coordination and innovation is needed. Transformational institutional innovation will be required to drive green development. It is widely acknowledged that the lack of (horizontal and vertical) coordination between

ministries and programs in China requires significant reforms.¹⁰² Internationally major governments have adopted greater coordination to more effectively tackle the challenge of complexity and uncertainty. While approaches differ in jurisdictions, underpinning rationales normally relate to reducing waste, increasing efficiency and improving outcomes. This must include a redefinition of the relationship between all levels of government. The Premier's articulation of a need for greater coordination is strongly endorsed by the Task Force, which recognizes that mechanisms to be adopted in China must fit China's needs. Government also needs more experimentation with performance-based, market-driven approaches while continuing to modernize and enhance traditional regulatory compliance and enforcement actions.

Box 9. Recent Policy Announcements and Commitments

The Technical Guide Rule of Environmental Impact Assessment (EIA) was delivered, which provided general principles, working guidelines, approaches and requirements of EIA on construction programs. In addition, the standards for coal selecting program was delivered, which provides references for evaluation of coal selecting programs and the EIA on coal resources exploration activities.

The Regional Biodiversity Evaluation Criterion was published. Applicable to regional biodiversity evaluation at county level, the criterion was set up to regulate biodiversity evaluation, taking account of national and regional biodiversity status, spatial distribution and variation trends, while identifying national and regional key biodiversity protection areas, and improving general biodiversity protection management.

The Coding Rule for Pollution Sources was introduced to process information and interchanges on national environmental pollution sources management, to promote environmental pollution prevention and control, improve environmental quality, and realize the standardization of pollution source identification.

Environmental Monitoring Measures were established to oversight the environmental monitoring system managed by the Ministry of Environmental Protection and carried by local environmental protection authorities at county level, and environmental supervisory agencies at all levels. The measures aim to establish a sound coordinated working mechanism providing necessary guidelines for environmental supervisory agencies.

The State Council recently issued '**Several Opinions on Further Promoting the West Development Strategy**', which included: (1) promote ecological construction and environmental protection to realize the improvement of the ecosystem and increase farmers' income; (2) continue to speed up key construction projects in infrastructure; (3) further enhance rural infrastructure construction to improve the rural living conditions; (4) take forceful measures to adjust the industrial structure and actively develop and advantage industries that are characteristic of the region; (5) actively promote the development of key development zones and accelerate the growth of regional economic hubs; (6) strengthen the development of science, education, culture, health and other social undertakings to promote the harmonious development of economy and society; (7) deepen economic institutional innovation; (8) expand the funding channel; (9) strengthen the building of talent team; and (10) speed up the process of legal construction.

¹⁰² Asian Development Bank. *Toward an Environmentally Sustainable Future – Country Environmental Analysis of People's Republic of China*. Philippines, 2012, p.123

(d) Improved information and continuous transparent monitoring and evaluation must drive further adaptation. Decision-makers at the central and regional level and in communities lack reliable, relevant and accessible data on the quantity, quality and use of key aspects of all four “capitals”. These data are critical to ensuring that any changes to the stocks of capital are reflected and used to inform decisions on the quantity, quality and use of any particular stock at all levels of program delivery. There are many reasons why data are not available, such as cost, accessibility and scale issues associated with the large size and diversity of China. However, the result is that decision-makers and communities lack an accurate and balanced picture of whether “quality growth” is actually being achieved in a harmonious way, as the FYP directs, and whether green development is, in fact, occurring. International experience suggests that a wider range of sustainability indicators is required to inform sustainable decisions and planning. The following are some situations where information is currently inadequate:

- Renewable and non-renewable natural resource stock or carrying capacity data and an assessment of the impacts of use on the resource base. For example, extraction of mineral and fossil fuel resources as a proportion of total stocks.
- Natural resource management, biodiversity and ecosystem health-related targets specific to the western region in addition to China as a whole.
- Regional data to support the effective implementation of the Main Functional Zoning supported in the Five-Year Plan.
- Data and associated information management systems to monitor progress in the achievement of an integrated set of green development targets in both central and other levels of government.
- Accurate state of human health data relative to environmental quality indicators.

4.2 Why a Roadmap for Green Development is needed for Western China

Key finding 2: Western China requires particular attention and should be a priority for application of the roadmap approach to green development in China.

The roadmap approach clearly has potential application for China as a whole. However, recognizing the resource and human capital constraints, a risk/reward based approach suggests that the most immediate pressing needs and opportunities lie in Western China. Without adoption of a roadmap there is considerable risk of repeating old mistakes, but with higher negative consequences to a valuable but fragile natural environment and indigenous cultures, both of which are central to improved green outcomes. The rate of new development raises the level of risk considerably if it is not effectively targeted toward a green development model that effectively deals with regional disparities, resolves past problems and delivers new green growth.

Western China is very distinct and presents a situation where all of the challenges for green development and many of the opportunities co-exist. Most importantly the critical environmental challenges present a significant risk for the whole of China while Western China's natural resource wealth is becoming an increasingly important underpinning of the national economy.

The money and effort already invested in Western China forms a valuable investment base for green development but some problems remain stubbornly unresolved, not only because they are so large and complex but also because the solution to such challenges lies in the strategic and coordinated approach that underlies the roadmap concept. Moreover, many of the opportunities for a green pathway remain as unrealised potential requiring a new approach, not a continuation of past practice.

Finally, there is an opportunity here to "test" new approaches in a situation where change is a recognised necessity and to do so before all of the "new" government and business initiatives begin or are so far advanced that they cannot be re-directed. It is an opportunity at a scale to be found nowhere else in China today and it is one that will not be available again if the challenge is not addressed soon.

4.3 The Roadmap for Green Development of Western China

The following observations about the application of the roadmap approach to Western China serve as an illustration of the approach and as examples of the potential contents. It is not intended as a replacement for the detailed work that the Government of China needs to pursue to undertake such a strategic planning approach.

Table 4. The Green Development Roadmap for Western China

Destination	Guidance	Routes & paths	Methods	Position Locator
Goals & Objectives	Principles	Policy Foci	Governance Mechanism	Monitoring & Evaluation Framework
*Overall goal (green development in western China) <ul style="list-style-type: none"> • Indigenous capacity • Eco-friendly growth 	*Government leadership <ul style="list-style-type: none"> *Regional differentiation *Interdependence & coordination *Shared targets & accountability 	*Improved ecological protection & construction & wealth creation <ul style="list-style-type: none"> *Green energy and mineral exploitation & 	*Government regulation (central/provincial/local) <ul style="list-style-type: none"> • Plans • Legislation & regulation • Tax & fiscal 	* Environment assessment <ul style="list-style-type: none"> * Monitoring and evaluation matrix targeting at each policy focus area * Life-time monitoring mechanism charged by

<ul style="list-style-type: none"> • Social inclusiveness *Objectives for <ul style="list-style-type: none"> • Ecosystem protection & management • Mineral and energy management & pollution control • Poverty reduction & labor quality promotion • Sustainable urbanization • Industry transformation • Economic growth & social equality 	<ul style="list-style-type: none"> *Informed decisions *Long term *Market and non-market signals and mechanisms combination 	<ul style="list-style-type: none"> pollution control *Enabling & regulating new green industry *Enhanced green urban development *Improved institutions 	<ul style="list-style-type: none"> transfers *Market adjustment <ul style="list-style-type: none"> • Carbon market • Emission market *Natural resource pricing reform *Legal system 	<ul style="list-style-type: none"> the third party * Public participation * Evaluation on four ‘capitals’ <ul style="list-style-type: none"> • natural • economic • social • human
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4.3.1 Goal and objectives for green development in Western China

Key finding 3: Specific goals are required for green development of Western China.

Developing specific goals for achievement of “balanced, coordinated and sustainable development” in Western China is a task for government, but the Task Force considers they should be founded in protection and enhancement of the “four capitals” by delivering:

- Goal 1: Eco-friendly growth
- Goal 2: Social inclusiveness
- Goal 3: Indigenous capacity

4.3.2 Guiding green development of Western China

Key finding 4: Further guidance and engagement at all levels is required from senior leadership to achieve green development goals.

When the Task Force met with a range of officials in Beijing and the two provinces (Sichuan and Qinghai) they noted that the Five-Year Plan goals are not always effectively “translated” into practical guidance for officials at the various levels of government. These officials identified a number of conditions and commitments needed to achieve green development in Western China, presented here as a set of eight principles: (see Annex 1 for full listing)

- Government leadership at most senior levels
- Regional differentiation of the issues and solutions

- Interdependent and coordinated mechanisms
- Shared targets and accountability
- Local and accountable actions where appropriate (subsidiarity)
- Integrated and accessible information to enable better informed decisions
- Decision-making mechanisms focused on long-term outcomes
- Market and non-market signals and mechanisms

4.3.3 Policy areas and institutional mechanisms

Key finding 5: Integrated solutions are required to protect ecosystems, reduce poverty and expand economic opportunities to deliver green development in Western China.

(a) Prosperity and ecosystem protection through focus on infrastructure, employment and investment in human capital. Effective solutions to poverty require coordination of infrastructure provision (roads, schools, healthcare, communications and environmental services) with improved educational programs and provision of employment. Since many of the most poverty-stricken communities are situated in locations of greatest ecological fragility where eco-compensation and eco-construction programs are required, and where there is significant potential for both nature-based and culturally focused tourism, there is significant potential to develop long-term programs which deliver joint benefits.

(b) Industrial transformation based on regional assets to expand employment and prevent the spread of polluting industry. W. China has significant assets that can be capitalised on to create and expand employment and investment. Examples include eco-construction programs, tourism, agricultural product processing, and a service economy. At the same time the pollution from old “brown” industry needs to be cleaned up while preventing the relocation of new “brown” industry in the region. Such initiatives will require extensive initiatives in coordination and re-prioritising, in particular central government funding programs. This includes (but is not limited to) new applications of infrastructure works, extension and local retention of resource taxes, incentive funding for innovation, establishment of thresholds for waste emissions inside the restricted development zones.

(c) Sustainable urbanization to provide attractive functional new centres for growth. Adopt a differentiated and tailored urbanization policy that is coordinated with the implementation of the Main Functional Zoning. Urban development should strive to be a vehicle for achieving Main Functional Zoning within its larger regional context, rather than undermining it.

Enhance urban infrastructure investment as a preventative measure against the negative environmental impacts of urbanization. Given the strategic importance of the western region in terms of water resources in China, and given the relatively low development and financial capacity for the region to build costly urban infrastructure from the beginning, it is essential to develop an effective and efficient financial mechanism to install urban environmental infrastructure upfront, rather than waiting for the cities to obtain financial power to do so.

Develop a long-term, green, eco-city development strategy as follows: building standards and regulations need to be established and implemented; a compact urban development model needs to be adopted to avoid urban sprawl; public transportation systems should be given higher priority; a long-term, green industrial development strategy needs to be established as an integral part of urban development strategy to support urban functions; and state-of-the-art and suitable technologies, planning and management approaches need to be sought out and adopted.

Invest in “soft” infrastructure. Invest in building a number of medium-sized, attractive and highly livable cities that provide a state-of-the-art physical and cultural living environment, with higher education institutes and R&D centers. These cities can be anchors of the region in attracting and retaining high-level human capital and high-value-adding industries, eventually hubs for regional innovation and incubation.

Adopt a systems approach towards integrated urban-rural development to enhance urban-rural mutual support and co-development. This should enhance and harness positive spill-over effects from urban development.

Key finding 6: Innovation is needed in institutional structures and approaches

(a) The Main Functional Zoning challenge The Main Functional Zoning system is a key mechanism for planning and decision-making that protects essential ecosystems and directs development to appropriate locations. It is in its early stages of development and application and much can be learned from experience internationally. It currently appears to have limited application by local officials and is not well understood by key stakeholders in both the government and industry. The Main Functional Zoning needs to progress from the “strategic” level to become a vehicle to drive evidence-based planning of all four “capitals” and delivery of decisions which guide development and ecosystem protection at the local level. It also needs to be supported by appropriate data sets and trained staff and it needs to be well tied into planning for urban development, ecosystem protection and environmental impact

assessments of industrial and infrastructure developments. Such improvements will require cooperation among a wide range of officials at all levels and across a range of disciplines.

(b) Financial mechanisms and infrastructure development These are critical “investment programs” made by central government but they are often characterized as being uncoordinated, short-term, crisis- or issue-driven responses to needs and pressures. They are the key strategic tools which can be employed by government to drive green development and innovation, but that will require adoption of integrated goals and putting in place or re-invigorating a central organizational “architecture” to oversee the delivery of a concerted program.

(c) Market institutions This is the other key mechanism. Green development requires innovation and entrepreneurial solutions to problems and approaches that go beyond the traditional “command and control” measures of regulatory agencies. China clearly intends to employ market approaches. However, the nation lacks much of the necessary architecture that is essential for a fully functioning marketplace. Experimentation and a long-term plan will be required, one that is driven from a central agency.¹⁰³

(d) Independent monitoring and assessment systems Green development will require creative adaptation as well as new integrative approaches. Effective adaptation requires publicly verified monitoring and assessment. Without accurate and transparent information and a neutral publicly accountable entity this initiative will fail to produce the necessary results.

4.3.4 Monitoring and evaluation framework

Key finding 7: New monitoring framework and evaluation approach required for green development.

All successful change initiatives require continuous adjustment. This can only be successful if there is a well-developed system that is based on dependable and accurate information that can be used to continuously monitor, report and evaluate progress. In China there has been much work on such systems in recognition of the need to provide officials with accurate reporting and as part of the system to recognise and reward officials. However, officials report that it has been hampered by lack of

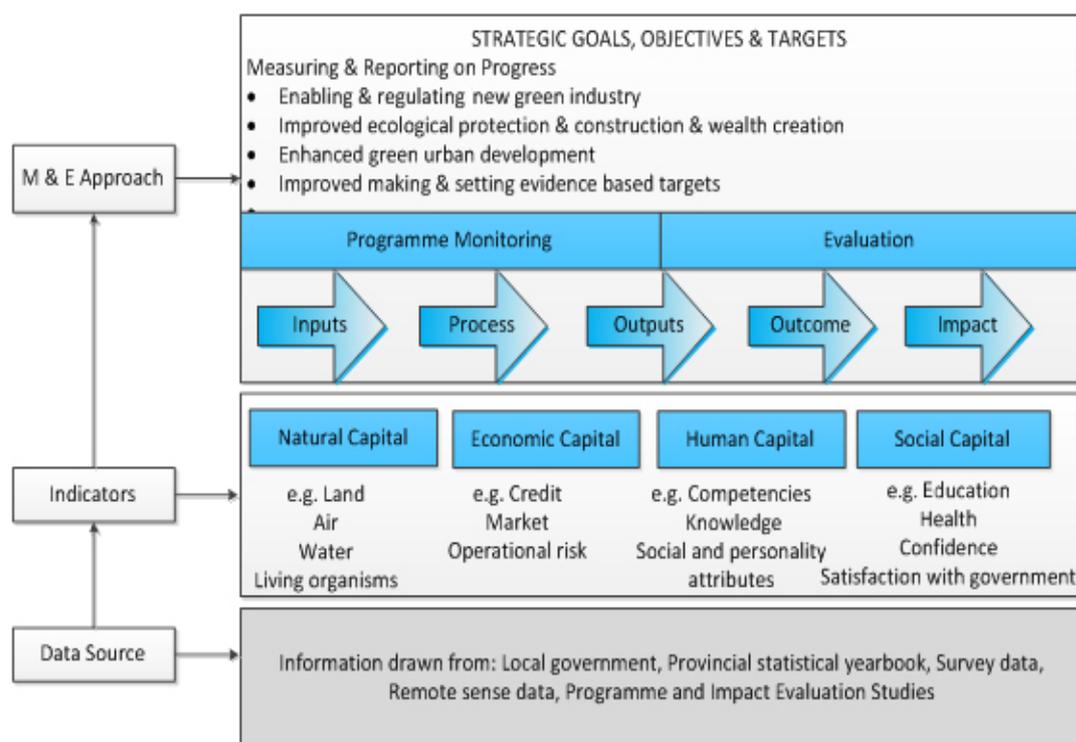
¹⁰³ Han, G., M. Olsson, K. Hallding, et al. *China's Carbon Emission Trading: An Overview of Current Development*, January, 2012

consistent, accurate, reliable, integrated and publicly verified information. In addition the basis for evaluation and action on green values and data is not as well recognised and developed as it is for such things as GDP. The Monitoring and Evaluation Framework is a first step in developing such an approach.

The objectives of the Monitoring and Evaluation Framework are to collect and provide accountable information that will be used to:

- Track progress on implementation of all components of the green development
- Identify gaps and weaknesses in service function provision
- Plan, prioritize, allocate and manage resources
- Monitor the impact of development in Western China on four kinds of “capitals”
- Measure effectiveness of treatment
- Report publicly on current status of key values and progress toward targets.

Figure 7. Monitoring and Evaluation Framework



5 POLICY RECOMMENDATIONS

Consistent with the Task Force key findings and the proposed Green Development Roadmap, the following pages present those items which in the opinion of the Task Force are the most important and necessary items for short-term action that would generate significant momentum for change to a green development

outcome in Western China. They require decision and action by the central government.

(1) The Government of China should prepare and implement as soon as possible a Green Development Strategy for Western China.

The Task Force has identified that there is significant need and potential in Western China for green development. However, despite various government announcements and the many initiatives underway in Western China, there is no comprehensive strategy in place that will deliver green development there. A business-as-usual approach will fail. Indeed such an approach endangers the achievement of some of the 12th Five-Year Plan objectives and will limit what might be accomplished in later five-year plans, since various objectives still operate at cross-purposes or are not optimized. Consequently the potential to achieve a different development model and outcomes reflecting the particular assets of Western China will be reduced. The Green Development Strategy should consider the following matters:

- Use the Roadmap for Green Development proposed in this report as a guide.
- The need for a single comprehensive and long-term green development plan (to 2030) covering appropriate infrastructure, human resources investments, urbanization, industrialization, environmental pollution control and, ecological construction and services provision.
- Each province should have a green development implementation plan based on a broader agreed Western China Green Development Strategy, with appropriate differentiation based on its assets and development needs. Sub-provincial level plans can then be developed within each western province.
- Ongoing investment and revenue sources to sustain this approach should be identified and set in place.

(2) Programs to deliver eco-construction and other means of protection of Western China's ecological services, ecosystems and biodiversity should be better integrated and coordinated with those for poverty reduction in provinces and at local levels as a long-term seamless set of programs with a more unified basis of delivery.

It is clear that in Western China (as in other parts of the world) the problems of poverty and ecological protection are completely intertwined and that a solution to the one involves also finding a solution to the other. There are significant new potential education, training and employment opportunities associated with eco-construction and eco-protection. However, current programs are short-term relative to needs and

not particularly well coordinated. Local people need to be far more involved in and responsible for these projects and for the continuing management of the projects when they are completed. A more unified program should include the following:

- Develop extensive, innovative pilot initiatives as the basis for long-term major ecological restoration and conservation.
- Central government to lay out and direct the program, and provide funding, guidelines and monitoring.
- Funds should go direct to communities to undertake this work where possible.
- Individuals should have long-term funding assurance for sustainable land management practices.
- Grasslands protection should be given high priority for this approach.
- Funding priority should go to evidenced-based programs.

(3) Invest substantially more in programs specifically designed to increase and improve human capital in Western China to reduce poverty, and to enable the pace and quality of green development to accelerate, especially through green infrastructure construction and servicing.

All studies of successful poverty alleviation indicate that an effective approach is through investment in infrastructure (transportation, communications and education), which China is now undertaking. However, green development requires a well-targeted focus on infrastructure critical for ecological and environmental services provision and protection (for example, water and waste, environmental monitoring stations, tourism services, grassland protection schemes). This needs to be done for both large and smaller communities as quickly as possible. A coordinated focus on human capital is an essential underpinning of this approach, including the following:

- Improve education and training opportunities, focused especially in poor and ecologically fragile communities by coordinating investment in hard and soft infrastructure for schools (and related institutions), health services, communications and teacher training.
- Build human capacity for green development by targeting opportunities to take advantage of the natural and indigenous potential for such businesses.
- Provide micro-credit and enable cooperatives to develop the capacity of women to improve their own, their families' and their communities' wellbeing.
- Fund local eco-protection, management and environmental engineering programs and training through long-term sustainable initiatives in rural areas.

(4) Reform financial programs and mechanisms at all levels of government to more effectively target and drive green development via sustained funding.

Significant central government financial resources have been and are continuing to be focused on environmental management and community development in the western region. However, the current approach of episodic and uncoordinated funding from a multiplicity of sources is resulting in sub-optimal results. Moreover, the complexity of the system presents difficulty for the poorest communities with the lowest capacities to take full advantage of the available funds. These are, however, the very communities that most need certain types of funding. Three key initiatives should be to establish a *Green Development Fund*, use the *Royalties to Regions* tax policy to support local green initiatives, and to accelerate environmental fiscal reform. In addition, there are other high priority needs for action on improved financial mechanisms that could be undertaken by central and local governments.

Green Development Fund

Given the strong historical reliance on government investment for growth, it is apparent that future growth in Western China will be strongly influenced by the availability of sustainable revenue sources. Commitment to a Green Development Fund will provide greater certainty and appropriate incentives for green development outcomes. The Green Development Fund should encourage “green development” and innovation at the provincial and local levels and ideally provide opportunities for some direct benefits to flow to communities. It may be targeted at both the macro and the micro levels: supporting appropriate “green industry” at the provincial or local level; and providing direct incentives at the local level to start up new ventures capitalizing on the region’s unique features; or undertaking activities to improve the management of ecosystem health. Funding can be directly provided by central government, ideally supplemented by industry-based levies sending price signals concerning more effective utilization and recycling of resources; (waste levies or pollution levies, or increased resource rents are examples).

Royalties to regions

Tax policy can be used more explicitly to provide funds for specific small projects in the western regions. Regions currently receive insufficient direct benefits from resource extraction industries, while bearing the associated direct costs of remediation. The government has publicly announced it intends to use a resource rent tax and other financial measures to progress broader economic, environmental and social measures. These measures need to be implemented as a matter of urgency. Funding should be tied and focused on priorities agreed between the national and provincial governments on a partnership or matching basis, ideally in accordance with

a provincial green development strategy that includes job creation and skills development.

Accelerate the application of environmental fiscal reforms, such as eco-compensation

Eco-compensation needs to move from being a concept to a policy tool that drives green development. The central government needs to prescribe the operating terms for an equitable eco-compensation system at level of the individual, the community and the province. The system should acknowledge the value of ecosystem services provided by Western China but also reimburse the individual rural residents on a long term basis for undertaking desired resource stewardship responsibilities. Clear definitions need to be determined regarding the level of general transfer payments to provinces rather than an ongoing reliance on more short-lived grant programs. Government at central and local levels should undertake the following actions:

- Gradually move away from time-limited, project-based funding toward a more programmed and predictable long-term funding model for eco-compensation, and focus compensation based on better performance concerning the specific ecological services provided. Funds should go directly to farmers and villagers to support sustained results with a generational time span.
- Establish a Green Development Fund as a revenue stream to drive new green industry, to enable restoration and to incentivize change through funding, particularly at the community level.
- Require strategic environmental impact assessments (EIA) for all major projects to ensure green development concerns are addressed. Fund the development of an appropriate risk assessment model for use by provinces.
- Encourage integration or improved coordination of financial programs to avoid duplication and competition for resources, and set differentiated targets for program performance in various regions.
- Target additional support to specific green industries and businesses that have natural advantages in Western China or potential to become such: for example, services to or innovations in environmental technologies related to resource industries and environmental management, agriculture and food processing; eco-tourism business and services; production of traditional medicines, cultural industries, woolen carpet production, tourism and recreational businesses, such as the “agri-tainment” complex (farm-based tourism) near Chengdu.
- Apply the recently announced resource tax to specifically promote green development initiatives in the new “royalties-to-regions” program as proposed by

the Task Force. That would ensure the flow of benefits from the resource tax back to the communities as a dedicated fund targeted at specific programs.

- Encourage foreign investment in energy, environmental protection, infrastructure and mineral resources, including research and development.
- Extend the user-pay principle to all mining and resource development. Require this industry to actively contribute to community development needs above and beyond job creation. This would include healthcare programs, education and trade schools and programs, eco-restoration works and tourism opportunities to provide tangible returns to the local level
- Provide financial support to encourage transition from existing non-sustainable industrial and pollutant-generating practices, with a special focus on SMEs.
- Establish a Green Infrastructure Fund and ensure that regular (current and future) infrastructure expenditure is consistent with green principles. The aim should be to ensure that existing infrastructure spending reflects green development priorities and is also carried out in accordance with green development principles. This will allow the government to utilize a significant amount of its existing budget as supporting green development rather than requiring new funding. This is also intended to lead to better planning and coordination of infrastructure and can be used to leverage provincial spending.

5. Make Main Functional Zoning work effectively to support decisions and actions which lead to regional balance and green development.

Main Functional Zoning is a relatively recent but critical concept and initiative to guide ecosystem protection, industrial development and urbanization in China. In Western China, where developments interact intimately with key ecosystem functions, zoning is essential to guide officials to make decisions based on ecosystem knowledge and green principles which underlie the Main Functional Zones. However, the current system is still under-developed and not always taken into account in decision-making. The Main Functional Zoning is at such a macro scale that it lacks clear boundaries at the appropriate level of detail. It requires urgent attention to improve implementation in planning, development supervision and enforcement to improve its performance. Otherwise the Main Functional Zoning may fall into disuse and prove to be a hindrance rather than a benefit to ensuring regional balance and green development. Central government should improve the Main Functional Zoning system and its approach:

- Provide more detailed and specific directions concerning “restricted zones” and “key development zones” and establish zoning at a more detailed geographic scale in order to provide better information to local officials for detailed planning.

- Identify eco-functional conservation areas, values and ecological services that must be protected, including more focus on biodiversity and critical habitat identification and protection. Such areas are within the restricted and key development zones, but outside designated nature reserves or “no-development” areas. They are critical corridors or sensitive areas requiring special management.
- Integrate planning for national nature reserves and for urban and industrial planning along with the Main Functional Zoning system.
- Clearly identify the purpose and acceptable activities in “restricted development” zones and establish clear and measurable thresholds for development that reflect the characteristics of the zones.
- Strengthen the regulatory regime for the mining industry, including eco-compensation, and increase supervision of existing mining enterprises.
- Adopt a monitoring system (and use high technology satellites) to be applied to all “restricted areas” to ensure compliance with regulations.
- Strengthen enforcement capacity by enlisting local community support. Build the capacity of enforcement staff. Local government accountable for non-compliance.
- Improve the coordination of EIA with the Main Functional Zoning and include risk assessment, cumulative impacts and social impact assessment into EIA decisions, especially within restricted development zones.
- Improve natural resource data concerning ecological values and potential, to support decisions in the Main Functional Zones.
- Commit to state-of-natural resources auditing to be used to monitor progress and achievements in the application of decisions in Main Functional Zones.
- Improve granularity (geographic scale/detail) of the data and planning approach to address regional and local green development (including land, water use, biodiversity and resources issues).
- Give priority to progressing a sustainable water planning and allocation framework and appropriate natural resource pricing to support green development.

6. Develop and adopt a sustainable urbanization model, including an eco-city approach tailored specifically to the needs and interests of provinces in Western China.

Urbanization is an important conduit to ensure the green development of the western region. New urban areas can act as a focus for investment, innovation and the development of new opportunities. They can also be a magnet to attract people from poor and fragile rural areas and provide them with improved opportunities. However, done poorly, urbanization can concentrate and increase pollution, diminish the quality

of life for residents and add to the regional burden of environmental problems. Government should do the following:

- Adopt a differentiated and tailored urbanization policy, which is coordinated with implementation of the Main Function Zoning Plan.
- Enhance urban infrastructure investment as a preventative measure against negative environmental impacts of urbanization.
- Develop a long-term, green, eco-city development strategy in accordance with local assets. As rapidly as possible, move beyond the existing pilot level initiatives to make the eco-city approach widely accepted. Draw upon the experience of existing eco-cities in China and other parts of the world.
- Invest in soft infrastructure to enhance the livability and attractiveness of western region cities. Invest in building a number of medium-sized, attractive and highly livable cities that provide a state-of-the-art physical and cultural living environment, with higher education institutes and R&D centers that can eventually become regional innovation and incubation hubs.
- Take an integrated urban-rural development approach enhancing urban-rural mutual support and co-development as is found around Chengdu. Urban environment and development related planning, management and policy should maximize positive spillover effects of urbanization, and minimize negative resource, environmental or social impact in peri-urban areas.
- Ensure building and workplace safety issues are given a high priority.

7. Encourage new green industries that reflect the character of Western China in the key and limited development zones, especially in areas of high poverty and areas of the greatest potential.

There is significant unrealized potential for green development focused on the particular characteristics of Western China. Much of the current industrial development in the region is focused on a narrow band of industry offering relatively low levels of employment and which do not sufficiently provide opportunities based on the special character of the region. It is important to encourage new industry and green development based on the indigenous characteristics and values of the region. There is also considerable pressure and negative potential for “brown” industry to re-locate in Western China from the east and to spread poor practices into a region of greater ecological fragility. Government should do the following:

- Assist and encourage through specific funding and incentive programs the development of “green development industrial parks” where there is demonstrated potential.

- Identify a list of green potential development situations throughout Western China. For example, in Xining consider the potential to enhance existing initiatives using products from the grasslands to expand and enhance employment of rural residents while protecting the grasslands.
- Set a “green entry standard” for all industrial development, particularly in the restricted development zones, to ensure that polluting industry does not re-locate into the western region from elsewhere in China.
- Expand existing foreign investment channels while ensuring that any foreign direct investment (FDI) complies with China’s standards for environmental and social quality and, where appropriate, go beyond these standards.

8. Strengthen institutional innovation to drive long-term green development.

External assessments and statements by China’s senior leaders all recognize that innovations in the organization and management of institutions will be an essential part of achieving green development. This is particularly relevant in Western China, where the capacity of governments at the provincial and local levels is often limited and resources are stretched over vast areas. Innovations in improved approaches to vertical and horizontal coordination and cooperation appear to be essential aspects of a transformative change towards green development. Government should do the following:

- Adopt the principles proposed in the road map and commission an implementation process to complete the Green Development Strategy for Western China with appropriate targets and milestones.
- Strengthen/reinvigorate the Western Development Office and require all ministries to coordinate through this office initiatives for infrastructure and human capital development intended to enhance green development.
- Focus performance management for green development on senior local officials and shift to a broader outcome focus in assessing public officials.
- Establish a neutral monitoring and reporting function in a central agency of government and commit to public scrutiny and reporting.
- Establish in each province a coordinating function/committee of senior officials mandated to strengthen coordination of initiatives for green development (for example, all green infrastructure, human development, compliance and enforcement).
- Enhance and promote the roll out of the Ministry of Environmental Protection program to establish strengthened regional centers, and better coordinate it with similar initiatives by other ministries.

- Undertake in each province a set of pilots to transfer management responsibility and accountability for eco-construction programs to specific communities with appropriate resourcing.
- Coordinate and integrate fiscal programs to deliver the Green Infrastructure Program as identified in other recommendations.

If China is to continue its successful development path while simultaneously correcting past damage to environmental services and enhancing those same services, it will have mastered the most challenging set of circumstances encountered by any nation in history. In Western China that task is more daunting because this region is so environmentally fragile, many of the people are so poor and are representatives of minority groups for whom their traditional heritage is so important. Only by setting out and implementing a new integrated long-term strategy with a clear roadmap will this task be possible. Western China is the right region to begin the journey.

Annex 1. Principles for Green Development in Western China

Government leadership at most senior levels

Leadership and strategic planning by government is the political foundation for the green transformation, requiring a beyond-GDP mentality, not only at the national but also regional and local levels. Leadership is required in policy-making and governance mechanisms; by setting an appropriate regulatory framework, sending clear price signals and establishing an effective incentive structure.

Regional differentiation of the issues and solutions

One set of standards and approaches between central agencies and various regions or within the regions does not recognise and effectively adapt to discrete and significantly different characteristics of these various entities and the problems faced by Western China. The inadequacy of one-size-fits-all policy must be acknowledged and regional differentiation of the issues and solutions must be fully considered.

Interdependent and coordinated mechanisms

Interdependent and well-coordinated mechanisms should be strengthened to recognise interconnectedness among issues and to facilitate joint problem-solving including with the existing policies. Planning (cross-regional, sectional and jurisdictional) is required to be sufficiently broad in its focus to bring about alignment (rather than competition or cost/burden shifting).

Shared targets and accountability

Integration and coordination is improved where there are shared targets that acknowledge regional diversity and interdependence between regions in China and with clear lines of accountability.

Local and accountable (subsidiarity) where appropriate

Enable, empower and fund effective delivery of services and accountability at the provincial and local levels where appropriate. Local governments, which have been granted partial executive and financial power, should take responsibility for and be assessed on their delivery of green development.

Integrated and accessible information to enable better-informed decisions

Establish an integrated and accessible information system to improve the reliability, accuracy and integration of environment and resources data and improve the flow between departments. The information system should be independent, and this system must be accessible to not only governments at all levels but also the public. Only in this way it is possible to adopt an evidence-based approach to natural resource and land use planning and decision-making.

Decision making mechanisms focused on long-term outcomes

Acknowledge the long-term nature of the challenges and the need for sustainable growth measures to be pursued, and adopt a timeline stretching out to 2030. Decisions should balance improvement of long-term outcomes against current pressures.

Use of both market and non-market signals and mechanisms

Acknowledge the complementary roles of governments and the markets in driving reform. Market signals and mechanisms are more functional in increasing economic efficiency gains, while non-market methods such as executive intervention are more efficient in the field of environment protection.

Annex 2. Summary of the Feedback from Stakeholders

Regional differentiation and distinctiveness. Stakeholders pointed out that one set of standards and approaches between central agencies and various regions or within the regions may well not recognise and effectively adapt to discrete and significantly different characteristics of these various entities and the problems faced.

Principle of subsidiarity. Enable, empower and fund effective delivery of services at the local level where appropriate.

Coordination mechanism. A new approach is required to recognise the interconnectedness of many of the issues involved and to enable officials to work together to solve problems and deal with existing policies.

Integration. Highly related to coordination but taking the further step of formally aligning various functions and services to ensure accountable delivery of programs that will both protect natural values AND provide for social and economic advancement.

Build more effectively on the western region as a significant conservation area for natural values. This requires recognition in policy and in funding that the region has special values and characteristics, which mean that it will not be able to maximise industrial or other outputs and will therefore forgo some revenue opportunities. This in turn necessitates recognition of the particular costs involved, while the regional agencies may well not have sufficient funds to offset under current financial policies.

Use Main Functional Zoning more effectively. There was clear agreement that this is a significant tool but also many concerns that it has yet to be proven to be effective in enabling and supporting the decision-making process.

Improve the environmental assessment process. It was indicated that the natural values and constraints in certain parts of the region are of such importance and fragility that there is a need to “raise the bar” and to ensure that cumulative impacts are considered in decision-making. This was argued especially in terms of placing effective and justified constraints on the mining industry.

Comprehensive and specific plan for energy resources. These are of such a scale and have such significant implications for green development that a separate plan is required.

Poverty reduction is the focal point for this work. The Task Force needs to make it very clear that green development is ultimately about development that benefits the advancement of poor people and communities; and does so with no long-term harm to productivity of the natural environment.

Improve the performance evaluation process for individuals and programs. There needs to be an alternative to GDP that is formally recognised and backed up by an improved and fully integrated monitoring and evaluation approach, trusted and respected by all.

Costs and impacts of development need to be recognised, fully accounted for and properly offset. This applies particularly to all resource industries.

Eco-compensation mechanism needs to be formalised. There was particular concern that this needs to recognise the foregone profit (or simple loss) for individuals when they are asked on behalf of the entire nation to give up their historic occupation or place of residence.

Plans for financial transfers to the region needs to be fully integrated. This means that the flow of money needs to better and more directly relate to the demonstrated needs of the various government entities. At present, the feeling is there is little formal acknowledgement of these interrelationships.

Ethnic minority regions need a differentiated policy and practice. This would acknowledge the reality that these regions have very different cultures and very different approaches to, and opportunities to attain, increased prosperity.

Environmental Strategy and Measure for Transformation of Development Mode in Eastern China

1 Introduction

1.1 Background

Since the beginning of the Open Door Policy in 1978, China has begun to develop rapidly and became one of the world's fastest growing economies. In 2010, China overtook Japan to become the world's second-largest economy. The introduction of the Open Door Policy also triggered enormous changes in the country's economy, society and environment on a scale and at a speed that has not been witnessed in any other country.

From 1978 to 2010 per capita GDP of China increased 79-fold from 381 yuan to 29,992 yuan while over the same period exports grew 129-fold. Other economic indicators show similar dramatic changes. Economic growth has however come at a considerable environmental cost although there are now some indications that the rate and scale of environmental degradation may be slackening off as economic development becomes de-linked from damage to the environment. For example, between 1995 - 2010, SO₂ emissions increased by 15.5% and wastewater discharges increased by 65% but per capita GDP increased almost six-fold over the same period. Nonetheless, the Chinese environment remains under acute stress due to continuing high rates of economic growth and urban development, and associated environmental pollution, and habitat and biodiversity loss.

In recent years, the Chinese government has progressively addressed these concerns by pursuing a more appropriate balance between economic development and its environmental consequences. This has been achieved through the explicit and consistent statement of environmental objectives and targets in the 11th and 12th Five Year Plans (FYPs). In particular, the 11th FYP has laid down stringent targets on energy saving and emissions reductions, e.g. to reduce the energy intensity per unit of GDP by 20% and reduce the emission of major pollutants by 10% etc. Traditional sources of environmental pollution, including SO₂, NO_x and COD are to be significantly reduced during the period of the 12th FYP. Forest cover is also set to be protected and increased during the period of the current Plan.

This study was premised on some important observations: the more proactive and preventive approach attached by the Chinese government in tackling unacceptable levels of environmental damage and wasteful resource use (in particular water resources) resulting from thirty years of rapid economic growth, especially in the most developed, eastern coastal provinces and regions; the growing concern that removing these problems from one part of the country (e.g. Eastern China) might result in the geographical displacement of the same problems to other regions or localities (e.g. Central and Western China) unless more effective environmental and resource use safeguards are put in place; and the recognition of the need for cost-effective policies, regulations and other administrative measures to speed up and intensify the implementation of green development in Eastern China as well as in the rest of China.

1.2 Study Objectives

The goal of the study is to identify critical elements of green development for Eastern China. Expected outputs include sets of operational principles and guidelines for the promotion of green transformation, and effective modes and instruments of environmental governance, policy and regulation.

Three key objectives and research issues are identified:

(1) Development of a conceptual framework that identifies the crucial factors associated with green development

The processes of industrialization and urbanization are commonly seen to be in conflict with ecological well-being. Environmental pollution and degradation are often regarded as the price that a province has to pay for economic development and the urban transition. Most forms of urbanization begin with rapid industrialization involving intensive resource inputs (i.e. water and minerals) and substantial environmental impacts (i.e. air and water pollution, solid waste, impact on biodiversity) at the downstream end of the production cycle.

However, some scholars and policy-makers have argued that environmental degradation does not necessarily have to go hand-in-hand with economic development. Concepts such as sustainable development, ecological modernization, green growth and green economy suggest that, subject to a range of factors and conditions, economy and ecology can be effectively integrated in a way that preserves the

environment while maintaining economic growth. Building on the assumption that more effective management of resource use and pollution control can be balanced with economic development, these concepts promote economic efficiency and technological innovation within a framework of sound environmental governance.

(2) Review of the economic development trajectory in Eastern China (Beijing, Shanghai and the Pearl River Delta) and associated environmental challenges

The coastal cities in the Eastern China have experienced over three decades of rapid economic development based upon industrialization. In the last decade, some of these cities have undergone the economic restructuring process, which has led to permanent shut down of some polluting industries, reductions in industrial production, upgrading of industries to comply with stricter environmental standards or relocation of industries to the less developed Central and Western China. While the socio-economic contexts and detailed characteristics of the urbanization process differ from one city to another, in-depth study into the development trajectory of these coastal provinces can provide important insights into the pull and push factors that facilitate a greener economic restructuring process. Three study areas are identified for in-depth review and analysis: Beijing, Shanghai and the PRD (including Hong Kong Special Administrative Region (SAR)).

The review of the three areas examines five aspects of data and information, and statistical analysis is conducted to explore possible relationships between these aspects: (i) the key features of economic development and/or restructuring; (ii) application and effectiveness of environmental regulations and policies; (iii) other factors associated with the economic restructuring process (i.e. the role of the market, public awareness, etc.); (iv) natural resources, energy production and consumption, and energy use efficiency; and (v) changing environmental conditions.

(3) Identifying lessons learned from the qualitative and quantitative analysis, and setting out policy recommendations for green development in China

Based on the above objectives, the study provides a detailed assessment of whether the current economic restructuring in Eastern China provides a positive context for environmental improvement. The extent to which environmental policies and regulations, natural resource constraints, public awareness, market forces, etc., serve as barriers and/or catalysts for the green development process is highlighted. Proceeding from four basic propositions concerning pathways for green development

in China, the study highlights the successes and shortcomings in existing policy approaches to facilitating both economic development and environmental quality based on qualitative and quantitative analysis. The study sets out six general recommendations applicable to the whole country and an additional six intended to further strengthen green development in the developed part of Eastern China.

1.3 Methodology

(1) *Desktop research*: the study builds upon existing CCICED initiatives such as the recently completed reports on "Development Mechanism and Policy Innovation of China Green Economy" and "Green Transformation of China Economic Development Mode" and various other initiatives focusing on energy, environment and sustainable cities. Literature reviews have been carried out on recent reports on green development and green growth published by OECD and UNEP, and others.

(2) *Quantitative data analysis*: in order to provide an evidence-based investigation, quantitative data for Beijing, Shanghai and PRD (including the Hong Kong SAR) on economic structure and transformation parameters (GDP, Industrial Output Value, energy production and consumption etc.) and environmental conditions (emission inventories, wastewater discharge, water quality, biodiversity etc.) over recent years have been collected from relevant government published sources. We note, however, that analysis is constrained by incoherent data sets (different time span, measurement units, etc.)

(3) *Qualitative and Case study analysis*: qualitative analysis of three mega events (the Beijing Olympics, Shanghai World Expo and Guangzhou Asian Games) has been carried out to understand their impacts in terms of providing a stimulus for short to long term environmental improvement. Local case studies are also used to illustrate the effects of economic transformation on environmental conditions. These include a review of the Suzhou Creek Revitalization in Shanghai and the introduction of Ultra Low Sulphur Diesel fuel in Hong Kong. The two international case examples studying the de-industrialization process of Malmö in Sweden and the role and functions of air pollution control policies and regulations in Los Angeles also provide insights to help analyze the situation in Eastern China.

(4) *Brainstorming sessions*: based on the statistical analysis and case study observations, intensive discussion sessions have been conducted to formulate the study recommendations. The study team has drawn upon the views and feedback from academics and senior government officials from the three study areas, CCICED's

chief advisors, and higher-level policy makers to help finalize the analysis and recommendations.

2 Eastern China: Development Trajectory and changes in Environmental Quality

2.1 Economic Change, Restructuring and Environmental Quality in Eastern China

Different parts of Eastern China had different development patterns and trajectories as each area has its unique features such as historical context and strategic function. In order to complete the perspective of Eastern China, this study considers three focus areas that demonstrate more advanced development, i.e. Beijing, Shanghai and the PRD, so as to illustrate the relationships between economic performance and environmental quality.

Serving as the country's bridgehead, Eastern China was the first region to initiate the modernization process. The most rapid growth can be observed in the past three decades when industrialization and urbanization took place. GDP increased both sharply and continuously. There was a population influx from rural to urban areas over the past three decades. Relocation activities also occurred as production plants moved away from core city areas to peripheral areas or suburbs owing to various factors like saturation in traditional industrial markets, spiraling production costs and planning policies. The industrial structure also entered a transformation phase in which areas with a comparatively advanced economy saw secondary industry overtaken by the higher value-added industry / tertiary industry. The contribution from tertiary industry then incrementally grew to over 50% of GDP, resulting in the establishment of a "3-2-1" economic structure. For example, in Beijing and Shanghai the tertiary sector has accounted for over 50% of GDP since 1994 and 1999 respectively. The tertiary sector has become serviced-based and the major economic driver, and signifies the post-industrial characteristics of the more developed cities in Eastern China.

While Eastern China has undergone industrial relocation and restructuring, these activities have resulted in different levels of adverse impact on the environment. However, the study indicates that the industrial restructuring shows some success in localized environmental improvements in terms of reduction in the rate of environmental deterioration. For instance, manufacturing plants that use diesel-powered generators have been closed and cleaner power plants (for electricity

generation) have been progressively introduced into the market; the development of centralized heating systems for urban households and encouraging urban residents to use more natural gas instead of coal, etc., have reduced pollution emissions.

These development trends are not extraordinary and have been observed in western countries as they have industrialized and urbanized. However, the development in China is at an astonishing speed and on such a huge scale that both positive and negative impacts have emerged very rapidly. It is therefore essential to establish the major characteristics of the economic transformation in Eastern China to prevent the recurrence of problems there in the near future, as well as to assist the formulation of development policy in less developed areas such as Central and Western China. As business-as-usual is no longer a viable option, pursuing the transition to a greener development path is deemed an appropriate response for the purpose of creating a low-carbon, resource-efficient and environmental-friendly society – a sustainable growth paradigm that should also be advocated in Central and Western China regions, so as to avoid repeating the mistake of “polluting first and cleaning up later”.

2.2 Beijing

Being the national capital, Beijing has multiple roles. It serves as the country’s political, cultural, education and international exchange centre. It is also the national economic and financial policy-making and management centre. Over the years, Beijing has actively initiated development of urban infrastructure and this can be divided into four phases. The first phase occurred (between 1949 and 1980s) and focused on the development of a heavy industry-led economy. During the second phase (1980s – mid-1990s) its role as an economic centre weakened gradually and the economy shifted from industry- to the service-sector. During the third phase (mid-1990s – early 2000s), Beijing enhanced its functions through globalization and the advocacy of a “capital economy” development strategy. In the fourth phase (since the early 2000s), the 10th FYP defined the four aspects of capital economies, namely technology-based economy; service-based economy; culture-based economy; and open economy. At present, the “capital economy” development concept continues to develop and intensify, and this is driving the city towards a knowledge-, headquarter- and green-based economy.

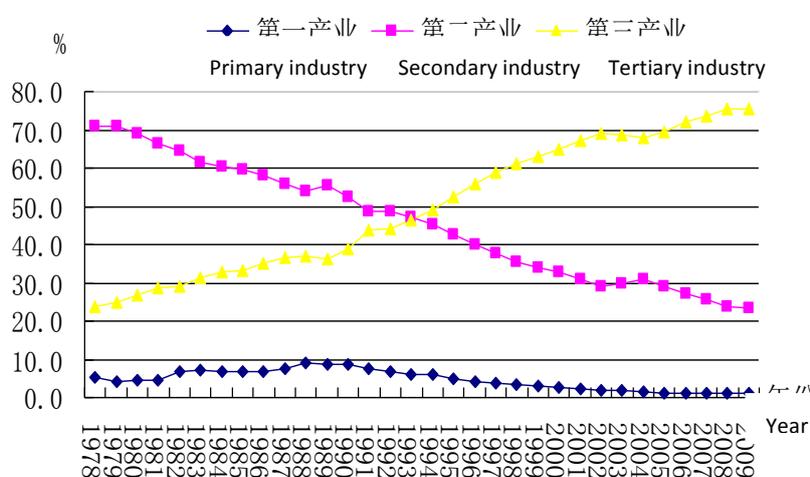
The population of Beijing has grown dramatically over the past 35 years. The reform and opening up policy resulted in a large population influx and an over-flow of the registered and floating populations in the urban area. The rapidly expanding

population exceeded the city's carrying capacity, causing impacts on natural resources and ecosystems that triggered off a chain of social, economic and ecological problems. In 2011, the city recorded a total population of 20.186 million (including both registered and floating residents). Compared with 1978, the registered population and floating population have increased by 2.2 times and 32 times respectively.

Regarding the economic performance, Beijing experienced a rapid growth in GDP starting in the 1990s. The annual economic growth rate reached double digits after the application to host the Beijing Olympics was submitted in 2001. By 2011, Beijing's GDP exceeded 1,600 billion yuan. The GDP was 4.5 times the 2000 level and the GDP per capita was over 80,000 yuan.

As highlighted in the previous paragraph, the opening up policy and official recognition of "capital economy" in 1998 has encouraged the growth of tertiary industry in Beijing. At the same time, it has gradually encouraged Beijing to transform from a key industrial base to a tertiary-based service economy. The city's industrial structure first shifted from "2-3-1" to "3-2-1" in 1994. Divergent development between secondary and tertiary industries are noted thereafter. The ratio of primary, secondary and tertiary industry changed from 5.9 : 45.2 : 48.9 in 1994 to 0.9 : 24.0 : 75.1 in 2010. This implies that the transformation from manufacturing-based to service-based has been completed, and the city has entered the post-industrialization era.

Figure 1. Changes in composition of primary, secondary and tertiary sectors in Beijing (1978-2009)

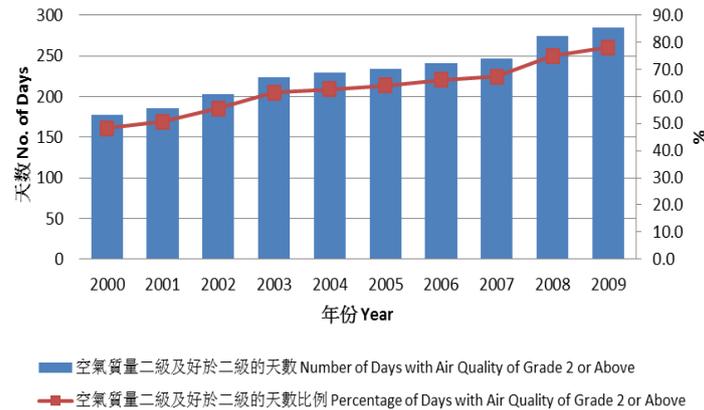


Source: Beijing Statistical Yearbook (1979-2010), Beijing Municipal Bureau of Statistics

Notwithstanding this transformation, the industrial sector in Beijing also experienced modernization. Within the primary industry, the operation changed from the traditional planting and breeding industries to modern urban agriculture, such as seed agriculture and agri-tourism. For secondary industry, hi-tech industries were the driver with automobiles, electronics and construction materials as pillars, and machinery, iron and steel and chemicals providing the base. In the tertiary sector, there was steady growth in the traditional service industries such as transportation and logistics, wholesale and retailing, while modern service industries such as financial, information, and technology services also developed rapidly. The pattern of urban construction evolved from single-centre to multi-cores. The industrial pattern has become more rational with the formation of industrial development zones, hi-tech zones, cultural zones, and special-characteristic zones. However, observations over the past decades suggest that Beijing has only a limited influence on the economic development in its surrounding areas. Economic and industrial synergy between Beijing city and the nearby provinces has been limited.

The environmental management of Beijing is mainly the responsibility of the Office of Treatment of Three Wastes, which was set up in 1972 with the objective of reducing emissions of soot and dust, controlling pollution by phenols, cyanogens, mercury, chromium and arsenic, and also to promote work of environmental protection. Since the Open Door Policy, the rate of environmental treatment has not been keeping up with the speed of development, and could only contain increases in pollution; and so the quality of the city's environment continued to degrade. In the 1990s, coal consumption reached almost 30 million tons causing serious pollution. Ownership of vehicles has risen rapidly and along with it vehicular emissions. However, from 2000 to 2009, days with air quality of Grade 2 or above has increased, indicating various environmental control and industrial restructuring policies have taken effect. This index, however, accounts for only some pollutants, leading to on-going public concern.

Figure 2. Statistics on Air Quality Index of Grade 2 of above in Beijing (2000-2009)



Source: Beijing Statistical Yearbook (2001-2010), Beijing Municipal Bureau of Statistics

2.3 Shanghai

Shanghai has a long history of development. Being China’s largest trade port and industrial base, the city is now serving as a key economic, technology, industrial, financial, trade, exhibition and shipping centre. Since the economic reforms, Shanghai has undergone tremendous changes in its city positioning and development strategy, evolving from an industrial base to a multi-functional city. Its development path can be divided into three phases. The first phase occurred between 1978 and early 1990s. Under the influence of the reform and opening up policy, Shanghai repositioned itself from its sole economic function as an industrial production base to become one of the main economic, technology and cultural hubs in China and as an important international port city. The second phase took place during the 1990s. At that time, the government officially affirmed the development strategy that Pudong was being identified as the “leading head” in order to further open up coastal cities along the Yangtze River, turning Shanghai into one of the international economic, finance and trading centres to drive the economy of the neighboring Yangtze River region. The third phase commenced in the late 1990s. The “Master Plan of Shanghai (1999-2020)” was published and explicitly positioned Shanghai as a modern international city and one of the international economic, financial, trading and shipping hubs (i.e. “one dragon head and four centres”).

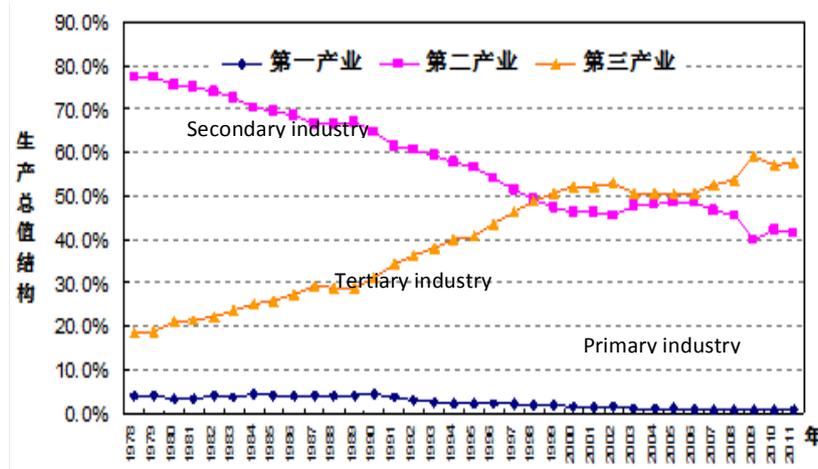
The population of Shanghai has sharply risen over the past three decades particularly due to the influx of a floating population. During the 1990s, Shanghai spearheaded the economic development of China with the development of Pudong. This attracted an influx of external labour to Shanghai seeking job opportunities,

causing a rapid increase in the migrant population. By 2010, the resident population of Shanghai reached 23 million, with an increase of 108.6% since 1978 (annual increase of 2.3%). The registered population in 2010 was 14.05 million, with an increase of 27.9% compared to 1978 (annual increase of 0.8%). The floating population recorded in 2010 was 8.98 million.

The GDP of Shanghai has grown rapidly over the last three decades. In 2011, Shanghai's GDP was 1,900 billion yuan. During the drive to develop Pudong in the late 1990s, the economy of Shanghai grew very rapidly with its GDP recording double-digit increases for 16 consecutive years (1992-2007). Since 2008, economic growth has slowed down (growth rate of 9.7% and 8.2% in 2008 and 2009 respectively) due to the international financial crisis and domestic economic downturn. The World Expo in 2010 drove economic growth back to 10.3% temporarily but it dropped to 8.2% in 2011.

Shanghai has served as an “industrial base” for a long period of time even before the Reform and Open Door Policy. Entering the 1990s, greater efforts were made to develop the tertiary sector. By 1999, the tertiary sector overtook secondary industry for the first time. At the end of 1998, in the view of international and domestic development trends, the Shanghai government decided to build hi-tech industrial zones by boosting industrial investment. Starting from the 11th FYP, the industrial structure of Shanghai underwent further adjustment guided by an energy-saving and carbon reduction strategy. The tertiary sector rapidly expanded while secondary industry started to slow down and became less important. The ratio of industrial structure was 57.3%, 42.1% and 0.7% for tertiary, secondary and primary industry respectively, implying the gradual formation of a well-developed “3-2-1” industrial structure.

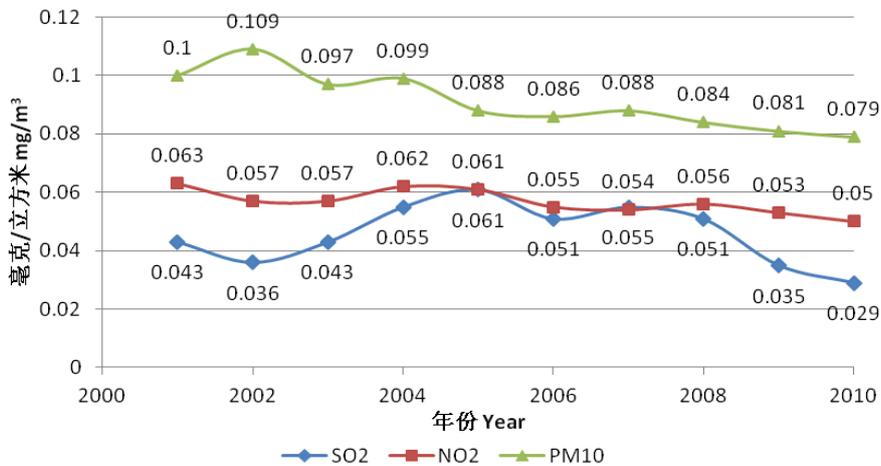
Figure 3. Changes in composition of primary, secondary and tertiary sectors in Shanghai (1978-2010)



Source: Shanghai Statistical Yearbook (1979-2011), Shanghai Municipal Statistics Bureau

Regarding environmental quality, the total waste gas emission of Shanghai city has been rising every year. The total waste gas emissions reached 1366.7 billion cu. m in 2010 which is three times the 1991 level. This increase is mainly due to the growth in industrial activities. Total emissions of SO₂ have fluctuated over the past 20 years. However, a significant drop in industrial emissions of SO₂ has been recorded recently. Dust emissions dropped rapidly between the 1990s and the early 2000s, and have remained steady since then. Concentrations of SO₂, NO₂ and PM₁₀ in Shanghai have been decreasing over the past decade. All three pollutant concentrations reached Grade II of the National Ambient Air Quality Standards. The rate of “good” ambient air quality in Shanghai reached 92.1% in 2010, in which Air Quality of Grade 1 also reached 139 days.

Figure 4. Changes in pollutant concentration level in Shanghai (2001-2010)



Source: Shanghai Statistical Yearbook (2001-2011), Shanghai Municipal Statistics Bureau

Wastewater pollution has continued to increase as a result of rapid industrialization, urbanization and increase of population. Over the past 30 years, wastewater discharges in Shanghai have increased every year. The volume was 1.835 billion tons in 1981 and 2.483 billion tons in 2010. While the industrial wastewater discharges have dropped, domestic discharges exceeded the amount of industrial wastewater discharged in 1996 for the first time. During the same period of time, COD of both industrial wastewater and domestic wastewater have decreased.

2.4 The Pearl River Delta Region¹⁰⁴

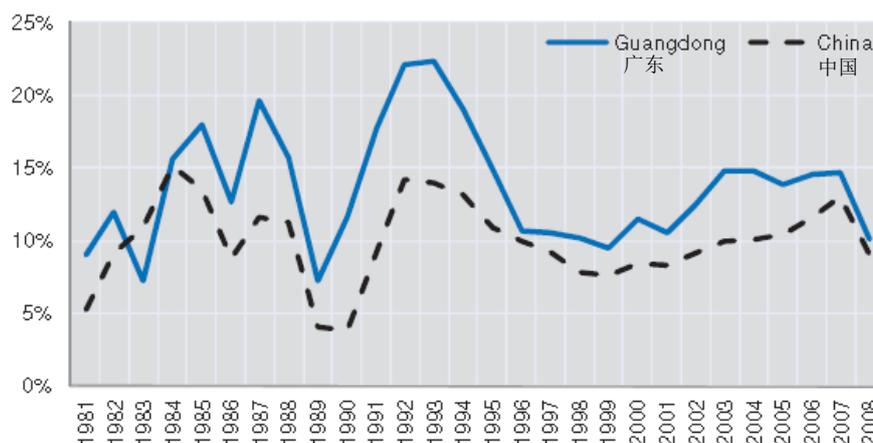
The PRD region has a different development pattern from Beijing and Shanghai. Located within Guangdong province, the emergence of the PRD Region has a close relationship to the development of Guangdong Province, which can be classified into the following stages: These include Pre-reform era (1950s to 1980) when few financial resources were invested in industry. During the Staged Reform (1980 to early 1990s), three major sets of reforms were proposed: major shifts in the structure of agricultural production; pricing reforms; and opening up of contacts and investment to the outside world. Guangdong's PRD led-boom peaked between the early 1990s and 2000 when the low land costs, tax breaks, and low-cost, surplus labour of the Special Economic Zones (SEZs) attracted the relocation of industrial firms from Hong Kong. The rapid economic growth in Guangdong also attracted an inflow of unskilled or semi-skilled workers from outside Guangdong. Producers of intermediate inputs were subsequently attracted to these "specialized towns", forming the Township and Village Enterprises (TVEs). Owing to uncontrolled and sprawling growth of urban areas and industry, the province has faced serious environmental challenges. Restructuring commenced after 2000 in which two major trends in the development strategy were defined. These are (1) increased share of higher value activity in information and communications technology, and (2) an important shift from labour-intensive to high value-added industry.

In 2010, the province had a total population of 104.3 million and the highest urbanization level of all Chinese provinces, excluding provincial-level municipalities like Shanghai, Beijing and Tianjin. Guangdong Province is the largest economy in China and has been a principal driver of the national economy over the last 30 years. In 2011, the province had a GDP of 5,300 billion yuan, making it the largest economy in China, representing 12% of the country's GDP. Since the inception of the "reform

¹⁰⁴ The Pearl River Delta region includes Guangdong Province and Hong Kong and Macao regions. The analysis of this study mainly focused on Guangdong Province.

and opening-up” policy in 1978, Guangdong has transformed itself from a backward agricultural economy to an industrial-based economy. The provincial economy is characterized by a larger percentage of industrial sector and lower percentage of primary sector than the national average. In 2009, Guangdong’s GDP was based on the following structural composition: 50.1% from the secondary sector, 47.4% from the tertiary sector and 2.5% from the primary sector.

Figure 5. Annual GDP growth rate of Guangdong and China (1981-2008)



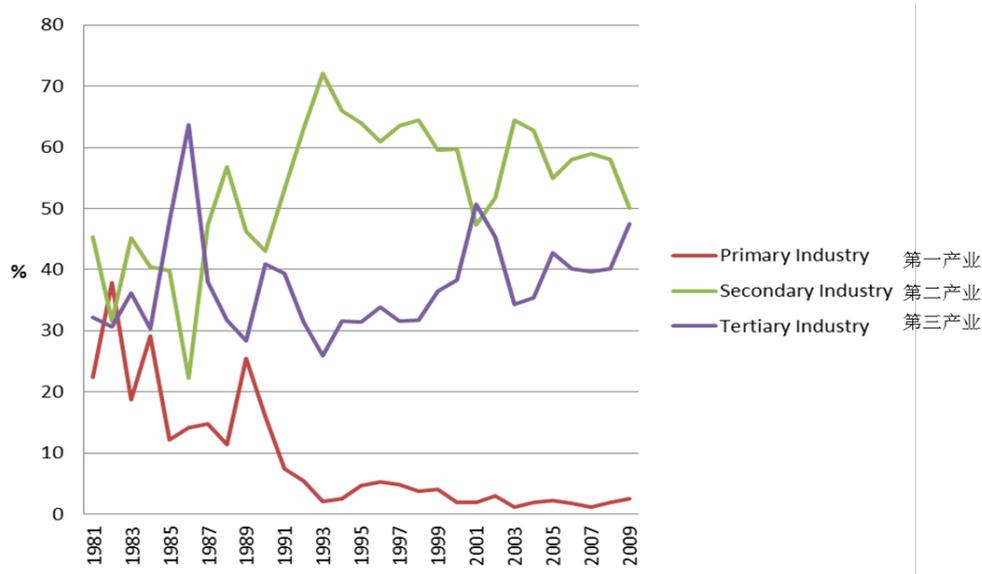
Source: Extracted from OECD (2010), OECD Territorial Reviews: Guangdong, China

Note: The data are calculated at comparable prices.

Guangdong’s model of economic development differs greatly from those found in industrialized countries. Over the last 20 years of industrialization, Guangdong’s manufacturing contributed to growth in total value added from industry. Guangdong’s economic growth has been characterized by a high trade to GDP ratio. A key development feature of this model has been “processing trade”, which allows companies to benefit from importing, assembling, and exporting via Hong Kong. This has allowed Guangdong to become the largest exporting province in China, accounting for 28.7% of China’s total exports in 2010.

Regarding industrial restructuring, the shift in GDP composition was from primary industry to secondary and tertiary industries. Cities in the PRD demonstrate two extremes – de-industrialization and accelerated industrialization. Guangzhou is a typical example of de-industrialization. Shenzhen has also started the process while other cities are still in the process of industrialization. In recent years, heavy industry (e.g. car manufacturing) has shown signs of returning to Guangdong. This accounted for the fluctuating composition of secondary and tertiary industry specifically over the past 20 years.

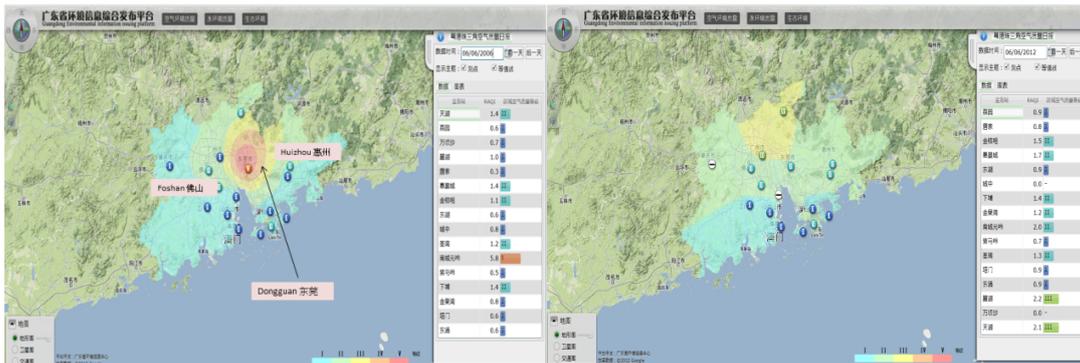
Figure 6. Share of the Contributions of the Three Strata of Industry (%) in Guangdong (1981-2009)



Source: Guangdong Statistical Yearbook (1982-2010), Statistics Bureau of Guangdong Province

Environmental data for the PRD region shows that emissions of industrial dust and SO₂ decreased gradually from peak levels in 1996 and 2005 respectively, while the total volume of industrial waste gas emissions has continued to rise within the same period (1996 – 2010). Similar trends are also found from the data released by the PRD Regional Air Quality Monitoring Network, which came into operation in 2005. The annual average concentrations of NO₂, SO₂ and Respiratory Suspended Particulates (RSP) between 2006 and 2011 reveal that the air pollution problem over the PRD region is gradually improving. This view is confirmed by comparing the PRD Regional Air Quality Index maps between June 2006 and June 2012, which show the most polluted area, Dongguan, already has improved. However, the air quality grading in neighboring areas (e.g. the north of Guangzhou city and Zhaoqing city) is decreasing. The situation may actually be worse since secondary contaminants such as PM_{2.5} and ground level ozone are not fully covered in these measures.

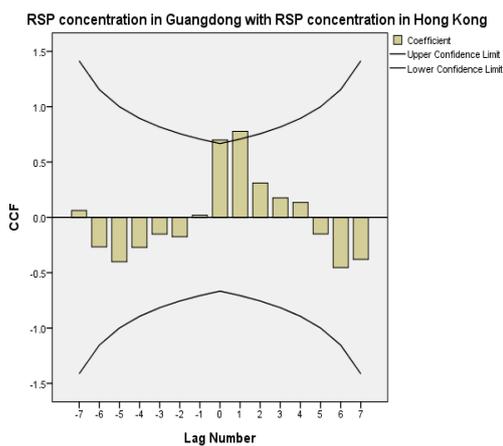
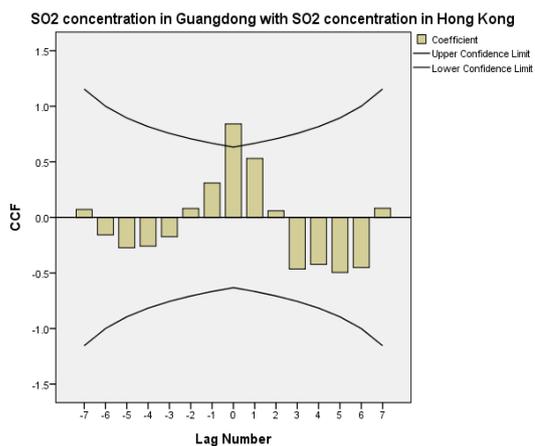
Figure 7. Air quality grading in PRD region on June 2006 (Left) and June 2012 (Right)



Source: Guangdong Environmental Information Issuing Platform, Guangdong Environmental Protection Bureau

To further investigate air quality from a regional approach, cross correlation was used to examine the relationship between air quality in Hong Kong and Guangdong using time series analysis. Significant relationships in the time series were found in concentrations of SO₂ and RSP in Guangdong and Hong Kong. Initial results showed that “RSP in Hong Kong” follows “RSP in Guangdong”. RSP in Guangdong is a leading and/or current indicator predicting RSP in HK currently (lag=0) and one year later (lag=1). “SO₂ in Guangdong” also serves as an indicator predicting “SO₂ in HK” currently (lag=0).

Figure 8. Cross-correlations of SO₂ concentrations in Guangdong and Hong Kong (Left) and Figure 9. Cross-correlations of RSP concentrations in Guangdong and Hong Kong (Right)



Source: Data are drawn from the PRD Regional Air Quality Monitoring Network

2.5 Mega-events and their Impacts

In reviewing the economic and environmental conditions of Eastern China from a macro perspective, it is clear that mega events have played a special role in accelerating the development trajectory (economic growth, social development, infrastructure construction etc.) and enhancing environmental conditions through a leapfrogging process. These mega-events are generally characterized by a long period of preparatory work ranging from 6-10 years. The events also have resulted in increase of GDP and reduction of energy intensity. This study covers three mega events, the Beijing Olympics in 2008, the 2010 World Expo, and the 2010 Asian Games.

2.5.1 Beijing Olympics

The Beijing Olympics is considered as the first mega-event introduced into China bringing significant changes in economic development and environmental management in Beijing. The earliest preparatory work dates back to 1999. Various measures were carried out based on the requirements of the “Green Olympics” laid down by International Olympics Committee. These measures follow the principle of sustainable development regarding the protection of the environment, resources and eco-balance. A key focus was on air pollution. Some key measures involved modification of the energy structure by using more natural gas and clean energy, expansion of rail and public transport, leap-frogging to more stringent vehicular emission standards (from Euro I to Euro III), relocation of heavily polluting industries, (e.g. Capital Steel Works), effective regional cooperation in pollution control, and adoption of a scientific approach in specific source identification through the use of a regional air model.

Another insight from the Beijing Olympics is the commencement of promotion and education. This is supported by a series of projects like “Green community”, “Green school” and “Green Commuting” as well as the development of ecological districts, leisure rural towns, and ecological culture, etc. These projects occupy an important niche to enhance environmental awareness and responsibilities among the community through public participation. They also induced behavioural changes in consumption, greener and safer production, and a sustainable living environment. While some policy measures were transient, many have remained in place. The Beijing Green Olympics set a model for “Green Development” leaving a legacy not only in Beijing but also in the rest of China.

2.5.2 World Expo

The World Expo served as another showcase for green development. In the lead-up to the Expo, Shanghai implemented various policies and measures that laid out in a Three-Year Environmental Action Plan in order to enhance the environment: strengthening of the integrated environmental management system; joint unit pollution prevention and control over the Changjiang Delta; improvement of environmental risk prevention and emergency response system; initiation of all-directional environmental monitoring and inspection work; and the promotion of “Green Expo” and “Low Carbon Expo” concepts. The evaluation concludes that Shanghai has achieved considerable improvement in environmental quality in the past decade, with the rate of “good” ambient air quality reaching 98.4% during the event

period and air pollutants such as SO₂, NO_x and PM₁₀ reduced to the minimum in the last decade. The event also facilitated the socio-development of cities, and provided a platform to facilitate the exchange of environmental protection work and ideas at both the domestic and international levels.

2.5.3 Asian Games

The Guangdong government followed a similar approach to that adopted in the previous two mega-events and implemented various measures during the pre-games and games periods. Some key measures included joint unit air quality monitoring work; desulphurisation and emission reduction in industrial plants; promotional use of National III vehicle fuel; and the green commuting campaign to encourage use of public transport and control private vehicle use. The data demonstrates that the emissions of CO, HC, NO_x and PM₁₀ were reduced by 42%, 46%, 26% and 30% respectively during the games period. Together with the infrastructure development for road and rail transport, the Games also provided a boost to tourism and other forms of economic development.

Mega events embracing a green theme indeed have served as an excellent catalyst for green development. They attracted enormous additionality of financial investments for the improvement of environmental conditions. Many such green measures are permanent, providing long-term benefits. Obvious examples are the expanded mass transit railway systems, and the leap-frogged vehicle emission standards. However, there are those measures that could only be temporary, such as the scaling down of production volume to reduce energy consumption and associated air pollution. The most important yet less tangible aspect of green development is the greater public awareness and people's empathy for a better environment.

Table 1. Key temporary and long-term measures implemented during the three mega-events

Temporary	Long-term
Reduction in industrial production	Infrastructure – railway construction
Closure of polluting industries during the event period	Industrial relocation
Drastic traffic control	Wastewater treatment
Intensive regional cooperation	Solid waste treatment
International tendering	Fuel ratio adjustment
	Traffic management and vehicle ownership policy

3 The Green Development Experience in Eastern China: Progress and Lessons

3.1 Four Propositions

Based on the literature and the statistics and case studies of the Eastern China reviewed, we identify four propositions to illustrate the elements influencing the progress of green development in the region in the recent decades. The four propositions relate to government policies and regulations, natural resources and public awareness, market forces and regional cooperation as the pull and/or push factors as well as major sources of opportunities and challenges for green development in Eastern China:

Proposition 1: Government policies and regulations facilitate green development – Eastern China's experience suggests that industrial restructuring and the transition in economic growth patterns were largely initiated by government through overarching policies, regulations and administrative measures. It should be noted, however, that there is considerable room for improvement in policy implementation and institutional arrangements.

Proposition 2: Natural resource constraints and increased public awareness give impetus to green development – limitations in the provision of natural resources and greater public awareness of the impact of environmental degradation may serve as two important push factors for green development. Natural resource endowments available to an economy or an area is a factor that influences the growth of certain industries, and the growing public awareness drives the government to achieve higher environmental standards and continuous improvement in environmental performance. It is also noteworthy that the rise of living standards and consumerism have posed considerable challenges to future work for environmental protection.

Proposition 3: Market forces as a factor influencing green development – the market is a basic mechanism for effective resource allocation, while the progress towards green development depends on the degree of market efficiency. The transition towards market-based economy started in the Eastern China region and such an ideology has contributed to various aspects of green development. These aspects include internationalization of production process and standards and the change in the economies of scale. However, also noteworthy is the fact that market forces can also lead to surplus production and increases in production cost and employment issues.

Proposition 4: Regional economic and environmental cooperation is a key enabling condition for achieving green development – in view of the regional differences in resource endowments, development status, industrial structure and human capital as well as the cost of pollution control, regional cooperation through co-development initiatives will ensure more efficient and cost-effective use of resources. However, the need for regionally-based initiatives addresses the challenges derived from the competing and reciprocal relationships among provincial and local units in contributing together to green development in China.

3.2 Decoupling Economic Development and Environmental Stress

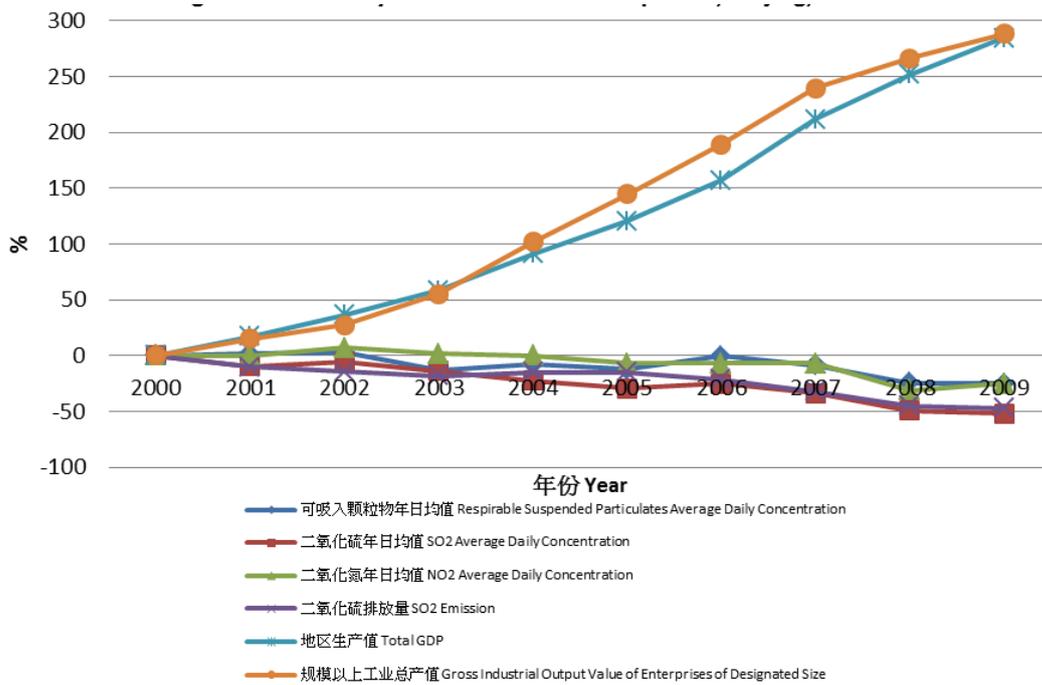
3.2.1 The decoupling trend

To identify and evaluate the elements that influence green development under rapid economic development, it is important to investigate the interaction between economic growth and environmental quality. Statistics were collected on Gross Industrial Output Value (GIOV) and GDP to reflect economic development. Emissions data and pollutant concentration data also were collected for portrayal of environmental condition.

Correlation analysis is used to test if there is relationship between economic development and environmental quality in the three focus areas of Eastern China. Significant relationships (either positive or negative) were found in almost all cases indicating the two have been inter-related. For example, the results concerning Beijing reveal that the selected environmental variables (e.g. emission concentration) negatively correlate with economic variables, suggesting that the environmental pressure in Beijing has decoupled from economic growth.

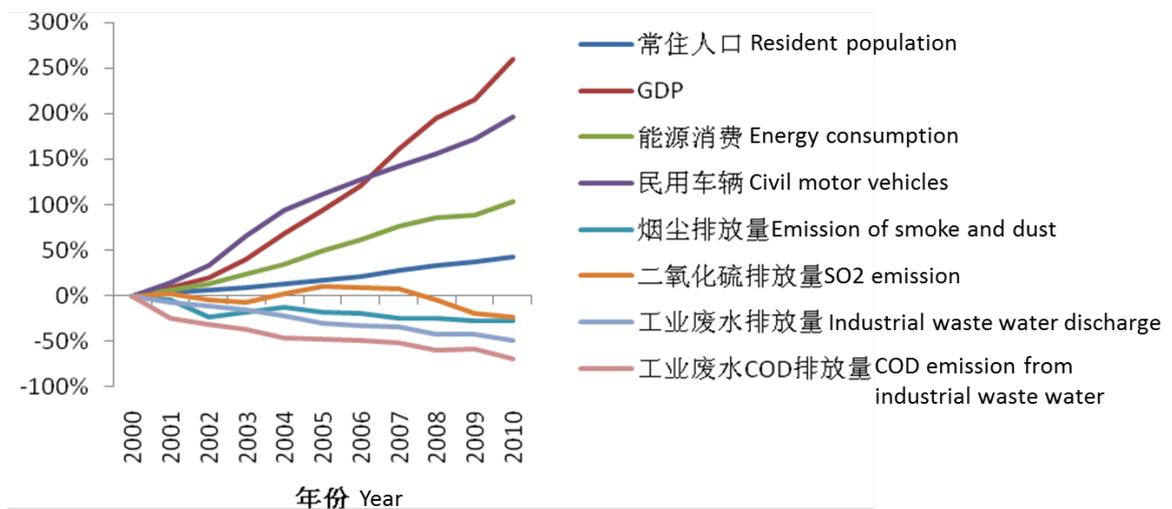
Simply reviewing the results of a correlation test might not show the decoupling of economic growth and environmental quality as the relationship is absolute, but through observation of trends, we could observe the relative decoupling of the two. Analyzing the statistical trends is helpful to examine the pattern of relationships between economic growth and environmental conditions over the past decade and even for the projection of future trends. The three figures below present the situation in Beijing, Shanghai and Guangdong. Trends of economic and environmental variables of all three areas demonstrate the relative decoupling of economic growth and environmental quality, where the rate of economic growth is much higher than the rate of environment degradation.

Figure 10. Changes in economic development and pollutant emissions and concentration in Beijing (2000-2009)



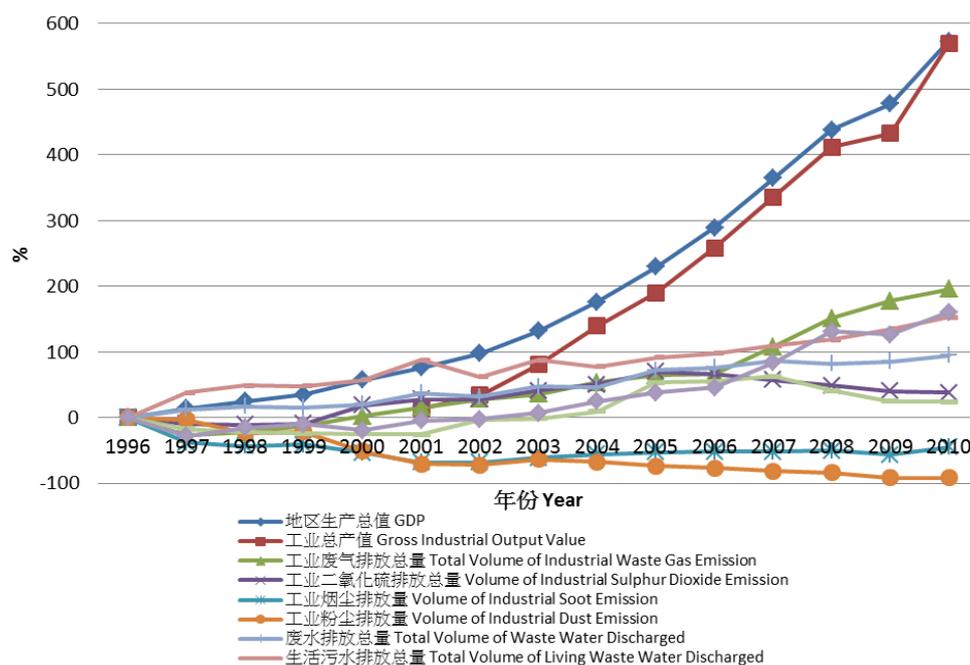
Source: Beijing Statistical Yearbook (2001-2010), Beijing Municipal Bureau of Statistics

Figure 11. Changes in economic development and pollutant emissions in Shanghai (2000-2010)



Source: Shanghai Statistical Yearbook (2001-2011), Shanghai Municipal Statistics Bureau

Figure 12. Changes in pollutant emissions and economic development in Guangdong (1996-2010)

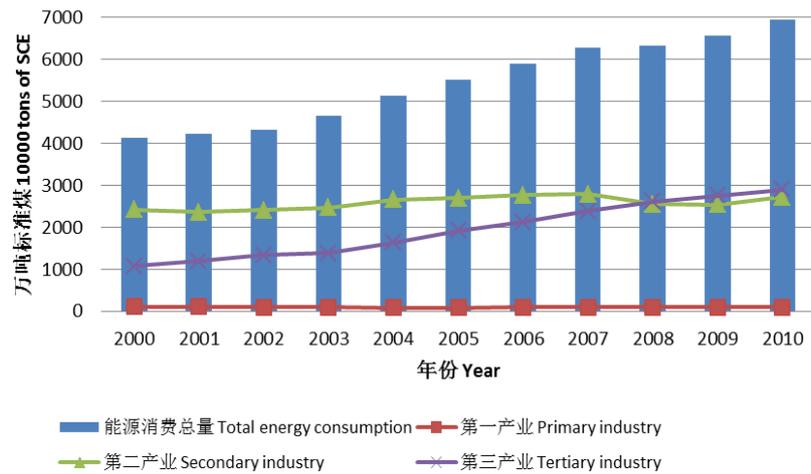


Source: Guangdong Statistical Yearbook (1997-2011), Statistics Bureau of Guangdong Province

3.2.2 Changes in energy consumption

Energy consumption also captures the dynamics between economic growth and environmental quality. In particular, energy consumption data by sector can, to some extent, reflect the possible effects resulting from economic restructuring and changes in energy structure. The data suggest that the tertiary sector has become increasingly important and is now the most important energy consuming sector in some areas. Data on energy production and consumption by energy source show the society is moving towards green development when the contribution from greener fuels is increasing. Data also show that usage of clean energy remains low while total energy consumption is rising rapidly every year.

Figure 13. Energy consumption by sector in Beijing (2000-2010)



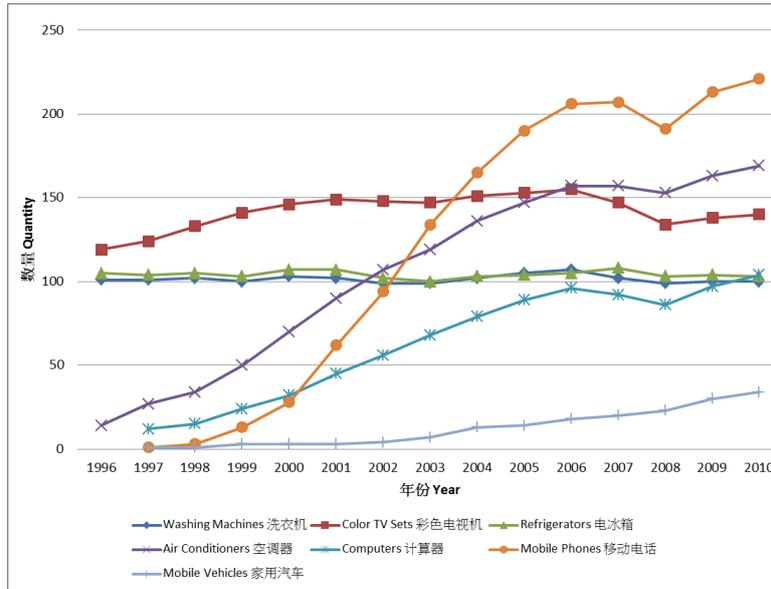
Source: Beijing Statistical Yearbook (2001-2011), Beijing Municipal Bureau of Statistics

3.2.3 Domestic consumption and emission

Industrial enterprises have been the significant contributor to pollution emissions. With rising living standards and emerging consumerism, the domestic sector becomes an increasingly important source of pollution. Figure 14 and 15 show the trends of increased possession of durable consumer goods, such as air conditioners, computers, mobile phones and motor vehicles in Beijing's and Shanghai's urban households.

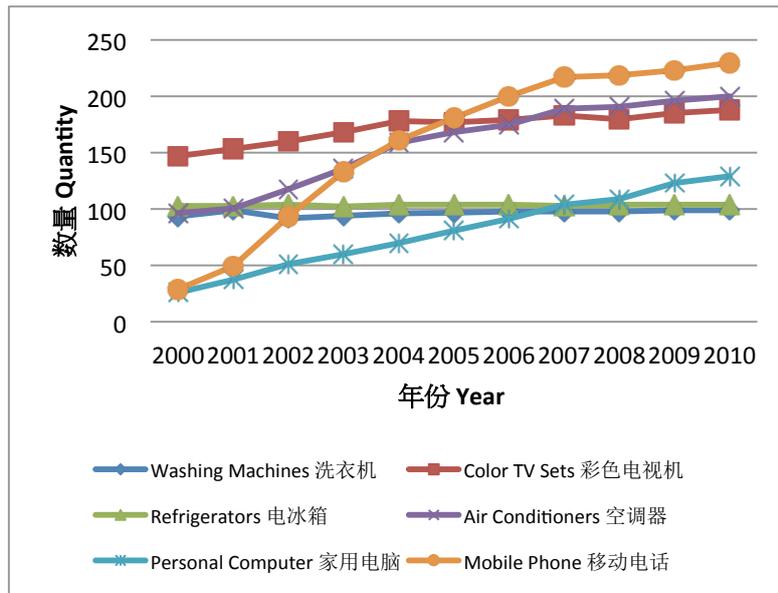
Increasing consumption inevitably leads to increasing pollution. Data suggested that the domestic sector contributed more than half of the NO₂ emission in Beijing from 2006-2008 (Figure 16). It shows that possible over-consumption is leading to greater stress on the environment, and that consumption behavior is becoming more significant in affecting the progress of green development.

Figure 14. Per 100 Urban Households Annual Possession of Durable Consumer Goods in Beijing (1996-2010)



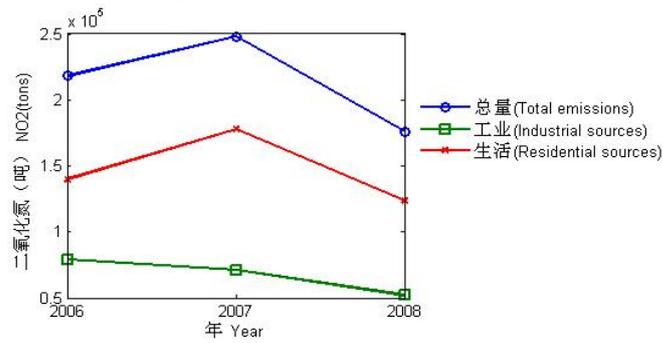
Source: Beijing Statistical Yearbook (1997-2011), Beijing Municipal Bureau of Statistics

Figure 15. Per 100 Urban Households Annual Possession of Durable Consumer Goods in Shanghai (2000-2010)

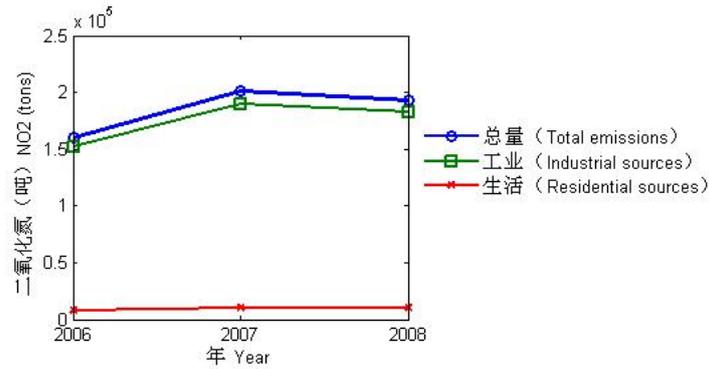


Source: Shanghai Statistical Yearbook (2001-2011), Shanghai Municipal Statistics Bureau

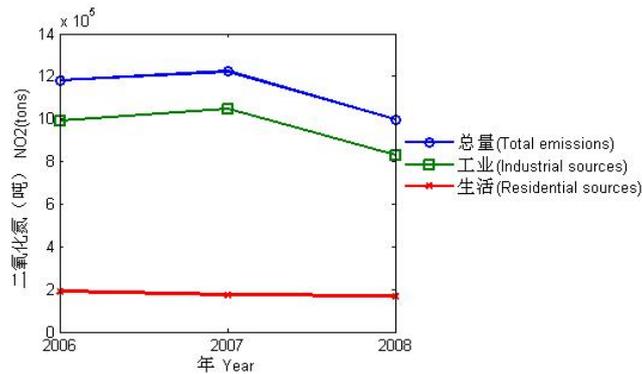
Figure 16. NO₂ Emission (2006-2008)



Beijing



Tianjin



Hebei

Source: China Statistical Yearbook on Environment (1999-2009), National Bureau of Statistics and Department of Environmental Protection

3.3 Conclusions

Successful decoupling of economic growth and environmental quality may suggest that measures and policies for pollution reduction have been effective, which indicates that policies and regulations can serve as a pull factor towards green

development. The rapid growth of economy is also worth noting as it would put pressure on the environment, while the influence of domestic and international markets would also affect progress towards green development. Energy is a major factor in environmental protection especially when consumption is continuously increasing and clean energy accounts for only a low proportion of total consumption. The adjustment of energy structure and raising energy efficiency are the key challenges ahead. The growing significance of the domestic sector in contributing to emissions raises concerns about the role of the general public in green development. Domestic consumption should become key focus in future environmental and social development policies. Emission data within the same airshed as well as the experience of mega-events indicate the importance of regional cooperation and co-development arrangements for more effective resource allocation and for reducing negative impacts on green development at the regional level.

3.3.1 To promote green economic restructuring and green development through effective policy implementation and institutional arrangements

China considers green development as an inevitable strategic choice that fits the context of the fundamental realities of a huge population, unbalanced development, shrinking natural resources and a fragile ecological environment. The Chinese government has been intentionally determining the pathway of its environmental policies. From the 1970s and 1980s, China defined environmental protection as a basic state policy, with its emphasis on industrial pollution control and prevention (especially end-of-pipe pollution control). In 1994, the Chinese government approved and issued China's Agenda 21, and developed a more comprehensive strategy, countermeasures and action plans for sustainable development. The notion that economic development should be based on the "circular economy" was officially confirmed, along with the establishment of "scientific outlook on development" and the promotion of an environmental-friendly and resource-efficient society. These efforts have yielded considerable results, which have effectively curbed some environmental deterioration and resource depletion, although major existing problems and some new ones continue to limit success.

Thus there is still considerable room and much need to improve. (1) *Increasing government efficiency and responsiveness*. It has been generally accepted that government bodies (at the provincial and local levels) responsible for the implementation of environmental laws and regulations are hindered by their weak institutional capacities. More importantly, a clear line dividing the functions of the government and enterprises is often missing under the largely state-owned economy

where the roles of the government authority and private enterprise are unclear. Thus, local authorities typically give priority to economic growth and investments over the stringent enforcement of environmental regulations and standards, which makes regulatory enforcement at the local level inefficient and sometimes virtually non-existent. (2) *A critical disconnect still remains between central government planners who lay down the broad policy directions and the local governments that are responsible for formulating plans and implementing the FYPs.* Critics also argue that some government departments have not developed enough awareness of green development, and without in-depth thought on what social, economic and environmental policies adjustments are needed in order to achieve green economic transformation. (3) *From an environmental governance perspective, the interactions between the government, enterprises and the public in the integrated decision making process for economic and environmental planning are very limited.* It is suggested that stakeholders' participation and information dissemination are particularly important, and the government should provide incentives to actively encourage industries and enterprises to become more self-regulatory and adopt international best practices. (4) *It is also widely acknowledged that China is moving away from a rigid, command-and-control system to a decentralized and more flexible environmental policy-making and implementation system.* However, more efforts should be made to achieve policy integration and strengthen institutional arrangements for fostering green development. These include more effective monitoring and implementation mechanisms, fostering use of market-based instruments, providing more opportunities for public participation, as well as increasing government transparency and accountability.

The recent proposal by the Ministry of Environmental Protection (MEP) to promote large scale environmental projects involves the construction of model sustainable cities with strategic planning covering all aspects of development including spatial design, industrialization and urbanization, innovative technology support, etc. This may provide a platform for focused efforts on institutional and policy innovation for the advancement of the environmental decision-making mechanism in China.

3.3.2 To achieve economic development goals with minimum natural resources depletion and environmental quality degradation while simultaneously increasing public awareness can give an impetus to green development

Natural resource endowments available to an economy or an area determine the development of certain industries, and the growing public awareness drives the

government to achieve higher environmental standards and continuous improvement in environmental performance. It is also noteworthy that the rises of living standards and higher levels of consumerism have posed considerable challenges to future work for environmental protection.

The heavy reliance on fossil fuels energy has limited the progress of green development in Eastern China. Rapid economic development since the Open Door Policy has relied on manufacturing industries that also turned out to be the major sources of pollution. Manufacturing has always been the leading sector in energy consumption, accounting for over half of the overall energy consumption in some areas. In Guangdong, final energy consumption has been rising steadily each year with 30-40% of the fuel mix comprised of polluting coal and oil. Electricity accounts for over 40-50% throughout the past decades but according to data from the China Electricity Council, electricity generated by renewable energy contributes to less than 20% of the total production. The use of natural gas and other clean energy sources for electricity production remained relatively insignificant.

Indeed, our analysis in the three focus areas of this study shows that domestic and other consumption of energy have been rising, and so too has their contribution to pollutant emissions. It is foreseeable that even though Eastern China is moving more towards the development of the tertiary sector. With rising living standards, the domestic sector would bring about more pollution than ever. Yet, public awareness of the impact of materialism on environmental quality remains limited.

But things are beginning to change. The promotion of green development has always been initiated by the government in a top-down manner but civic society is now gaining momentum in this area. Limited by regulations and with little resources and mobilizing ability, green groups have often encountered difficulties in assessing and monitoring environmental quality. But more green groups are becoming increasingly influential as some are now capable of monitoring the environmental impacts associated with business practices.

The advancement of society has created factors that can both slow down and speed up the progress of green development. Rapid industrial development led to a heavy reliance on non-renewable energy which continues to create pressure on the environment. Yet, with the increasing development of renewable energy and accelerating concerns about environmental quality and the growing influence of green

groups and civic society, it is possible that the effects of these constraining forces could be minimized.

3.3.3 Harnessing market forces to accelerate progress on green development

Market forces could serve as both a pull and push factor for green development in Eastern China. The influence of market forces would be internal or external. They help to drive the development of sustainable urbanization and to facilitate the development of knowledge- and innovative- based economies which are key contributors to green development.

Since the Open Door Policy, China has been experiencing a transition towards a market-based economy. China has moved from the planned economy, where economic activities were largely controlled by the state, towards the development of special economic zones, the development of private owned business and the introduction of foreign direct investment. The opening-up of markets has not only facilitated the growth of tertiary industries, but also improved living standards in the Eastern region.

The transition to a market-based economy has also made China more vulnerable to the influence of the global economy. While the macro-economic environment has been experiencing a downturn and slow recovery, China has to expand her domestic demand in order to maintain the continuous growth in GDP. Economic restructuring, the development of tertiary industry, urbanization, regional cooperation for development and increased individual consumer demand are sources of growth in domestic demand. While the government has played an important role in stimulating the domestic market and facilitating urbanization, it has also contributed to economic restructuring through various measures including setting up industrial parks. The private sector also has played a part in restructuring by relocation and upgrading of manufacturing factories. The trend of economic restructuring has also been reinforced by the development of tertiary industries. The growth of the tertiary sector has been identified in different regions. The proportions of tertiary industries in Beijing and Shanghai have already exceeded traditional secondary industries and have become the sector that generated the highest proportion of GDP. All these have contributed to the steady growth of domestic demand, which has facilitated economic restructuring and the development of tertiary industries and eventually has helped promote green development in China.

The experience of mega events demonstrates the role of the market in facilitating good practices in green development via economy of scales and international tendering. The huge market created by mega events created economy of scale for both the domestic and international market. These helped lower the price of costly technology that facilitated the adoption of green innovation.

The market-based economy also facilitated green development through more stringent environmental standards on export products. International markets are concerned about environmental and safety standards of products and production process. More countries have been imposing stricter standards for raw materials, domestic and imported goods and product life-cycles, and promoting environmental labelling. The pressure to conform to international environmental standards and to satisfy the requirements of customers around the world has encouraged China to move towards a more environmentally sensitive manufacturing process.

The influence of the international market also has encouraged China to place greater emphasis on research and development. The amount spent on R&D by enterprises has increased each year. Enterprises also spend huge amounts on applications for patents. All of these influences derived from an R&D emphasis are paving the way towards a knowledge- and innovation-based economy.

The transition towards market liberalization has, however, created other problems such as surplus production and possible destructive competition. State Owned Enterprises (SOE) have been privileged in capital and resources allocation, and have been protected by the state from competition. They tend to continue with product manufacturing even when the market cannot absorb surplus production. These supply-demand unbalances have occurred in various sub-sectors, for example, solar photovoltaic (SPV) production.

With increasing privatization, competition has become more intense with more regions of China, especially the inland regions, having opened up their markets. Regional governments strive for local GDP growth but at the cost of environmental quality. The private sector faces growing pressure in its operation. Production costs including land, material and labor cost have risen tremendously throughout the past decade. With increased competition and increased costs, some businesses were forced to close down or relocate inland without upgrading production facilities that slowed down the progress of green development.

On the whole, in view of the important role of the market forces on the economic restructuring process, it is essential for the government to strengthen the institutional arrangements and harness the market forces for more efficient environmental management and to encourage green economic restructuring.

3.3.4 To incentivize and advocate regional co-operation for achieving green development

With the experience of economic liberalization over the past 30 years, regional co-operation has now been intensified and more widely adopted in China. In the Pan-PRD Region, the “Administrative Measures for the Resolution of Conflicts on Trans-boundary Pollution in Pan-PRD Region” prompted the environmental protection agencies to establish regional joint commission for the handling of trans-boundary pollution disputes. Participating provinces are also required to introduce an information exchange platform, pollution enforcement inspectors and a border water quality monitoring system. In the Yangtze River Delta Region, various regional co-operation programmes are set out with a focus on remediation for water pollution and emissions of SO₂. Examples include the establishment of joint cities water pollution remediation system and water resources information dissemination system.

Regional co-operation mechanisms were also introduced through mega-events, including the Beijing Olympics, the Shanghai Expo and the Guangzhou Asian Games. Three major observations may be made.

First, these regional co-operation programs adopt a holistic approach, which comprises targets, action plans, implementation measures, monitoring systems and even contingency plans in some cases, to cover a wide range of areas such as environment, economy, transportation and urban planning. One of the examples of large-scale regional co-operation is the air quality assurance and monitoring work during the Beijing Olympics. It has developed computerized airshed modeling that takes into account the air pollution trends and meteorological factors over a wide region covering Beijing, Tianjin, Inner Mongolia, Shanxi, Hebei, Baoding and other peripheral areas. Apart from setting out various pre-games remediation and temporary control measures, the airshed modeling was effective in identifying the contingency measures needed when air quality deviated from the pre-determined level just before the opening ceremony.

Secondly, the focus of regional co-operation has shifted from purely economic in the past to both economic and environmental at present. Since China's Agenda 21, the aim of launching regional co-operation is no longer only to achieve high productivity levels, but also to safeguard the environment.

Thirdly, regional co-operation serves as a possible way to solve the trans-boundary pollution problems. The trend analysis and cross correlation test that were conducted between Hong Kong and Guangdong on selected air pollutants demonstrates the air quality of each place is affected by the other. The dispersion of air pollutants due to cross-border human and natural (e.g. wind) activities cannot be solely tackled by mitigation measures within their own administrative boundaries.

While regional co-operation facilitates sustainable development in China, there also exist difficulties and challenges. Economically, enterprises tend to opt for provinces where lower environmental transaction costs exist. Cooperation becomes difficult when provinces compete with each other in attracting enterprises to boost provincial GDP. Low or even no compliance with institutional arrangements from the participating provinces is resulted. There also exist challenges under the current political arrangements where different jurisdictions have made regional collaboration on air and water management between Hong Kong SAR and other cities in the PRD region difficult.

4 From political consensus to institutional and policy development: Principles and Recommendations for Green Development in China

Green development now forms part of a global policy agenda that has emerged in response to the imperatives of environmental degradation, biodiversity loss, climate change and global economic slowdown. For China, green development represents a strategic option that is consistent with the key challenges confronting the country, including huge population size, unbalanced development, declining natural resource base and environmental quality, and fragile ecological systems.

The Chinese Government has been attaching great importance to the promotion of green and sustainable development since the 1990s. In 1995, the 9th FYP initiated the concept that the economic growth model in China must be transformed from an "extensive" to an "intensive" growth. In 2005, the 11th FYP expanded the idea and proposed to bring into being a pattern of economic development with "low input, low consumption, less emission and high efficiency". It also laid down some concrete targets such as reducing energy consumption per unit of GDP, as well as the

long-term goals of promoting the capability of independent innovation, vigorously developing the circular economy, and accelerating the construction of resource-saving and environment-friendly society. In 2007, the 17th National Congress of the Communist Party of China put forward acceleration of transforming the mode of economic growth and optimizing and upgrading the industrial structure. The way of promoting economic growth was shifted from mainly relying on investment and export to relying on the coordination of domestic consumption, investment and export; from mainly relying on the secondary industry to relying on the coordination of the primary industry, the secondary industry, and the tertiary industry; from mainly relying on increased consumption of material resources to relying on technological development, improvement of labor quality and management innovation. From 2010 onwards, China continued to emphasize accelerating the transformation of its mode of economic development, in order to cope with the effects of the international financial crisis; adapt to the changes in the global demand structure; rationalize the distribution of national income; promote social harmony and stability; construct a moderately prosperous society, and meet the new expectations of the people for a better life. More recently the recommendations of the CPC Central Committee for Formulating the 12th FYP for National Economic and Social Development also highlighted that to accelerate the transformation of the economic development mode in China will constitute a profound reform in the economic and social fields, and each field will need a comprehensive, systematic and strategic transformation, including the reform of the development concept, transformation of the development mode and innovation within the development path.

4.1 Guiding Principles and Prerequisites

As mentioned earlier, a clear political commitment and policy direction is the most important prerequisite for green transformation in China. This study suggests it is essential that policy mechanisms and institutional adjustments are introduced and reinforced at all levels of government to ensure that the pursuit of green development is confirmed as a core and continuing task of government for all of China.

This study also proposes the following nine guiding principles to facilitate green development in China.

- 1)* This is a long-term transition process that in China's case will need to be continued in subsequent FYPs and major national strategies, and which will extend over many decades;

- 2) Green development is not just about economic growth but also about promoting social progress; green development is a process and not a single end-state;
- 3) Policy continuity is essential at both the central and local government levels;
- 4) An integrative, holistic view of the development process is adopted, one that extends across all policy domains;
- 5) The potential as well as the limits of both technology and market dynamics are recognized;
- 6) Sensitivity to the social dimension of the development process and its goals and objectives is required;
- 7) Both the positive and negative impacts of development are managed in a balanced way;
- 8) The importance of stewardship and the need for responsible management of natural systems and national heritage resources are recognized; and
- 9) The enhanced commitment to adhere to international conventions on sustainable and green development.

Progress towards green development will be influenced by the extent to which these principles can be articulated and made operational through policy systems and their supporting mechanisms. Policy makers are encouraged to recognize the importance of these principles and they should be refined and reaffirmed periodically to reduce the likelihood of “policy drift”.

4.2 General Recommendations for Facilitating Green Development in China

The pursuit of a green development strategy in Eastern China and elsewhere in the country will require systemic changes at both the macro (strategic or state level) and the local and implementation levels. On the basis of our study we put forward six general recommendations that are applicable to the whole country.

4.2.1 Recommendation 1: Improve policy integration and coordination

To integrate and coordinate different policy sectors, especially energy, transport and infrastructure, education and economic development, under the framework for green development in China:

- 1) Future FYPs should explicitly and consistently indicate in their objectives and quantitative indicators that environmental quality must not be traded off for economic advancement; and

- 2) The FYPs should be subject to an improved auditing, reporting and disclosure process that highlights potential problem areas and which alerts provincial and local decision makers to potential conflicts between key policy objectives (e.g. economic prosperity, environmental quality, biodiversity, heritage and so forth).

4.2.2 Recommendation 2: Strengthen regional monitoring capacity and measures

- 1) Enhance the supervisory and regulatory role of the Regional Environmental Protection Inspection Centre:
 - The Centre should be equipped with appropriate and additional manpower and resources, including state-of-the-art equipment (hardware) and database management (software) for performing its expanded duties;
 - The Centre should be endowed with specific regulatory powers to facilitate inspection and enforcement in an effective and efficient manner, e.g. to audit the emission inventory of industrial operations, including thermal power generation, and setting up a database with annual updates of the results; and
 - The Centre should become the overarching authority to oversee environmental monitoring on operations where an Environmental Impact Assessment (EIA) has stated the expected environmental quality outcome through the implementation of mitigation measures.

- 2) Establish a coordinating body under the State Council (proposed name, Green Development Commission or Environment and Green Development Commission):
 - The main tasks of this coordinating body are to provide a platform for discussion of policies relating to energy, industry, transport, infrastructure, economy, agriculture, environmental protection and nature conservation; and to recommend the considered policies to the State Council for implementation by the relevant Bureau(x) in a coordinated and timely manner; and
 - All relevant Ministry heads should be core members of the Commission and should be obligated to meet on a regular basis to discuss policy priorities, review implementation strategies and formulate future plans; this co-operation should go beyond the individual project level.

4.2.3 Recommendation 3: Strengthen policy implementation

To enforce more effective and stringent controls on minimizing the impact of development on the environment:

- 1) Strictly implement the Environmental Admittance System (e.g. more stringent emission standards and requirements of pollution abatement technologies) in order to prevent new sources of environmental pollution and displacement of polluting industries emerging in less developed regions;
- 2) Strengthen the EIA system and increase the rigour of its implementation to match international best practice:
 - Soil and groundwater pollution of industrial brownfield sites have become a barrier in the process of land redevelopment. However, the effective regulatory and institutional framework for brownfield management has yet to be established. There should be more comprehensive regulations and laws on brownfield site planning and more specific requirements for land decontamination / remediation under the EIA system;
 - Environmental performance committed to in the EIA reports should be strictly monitored. Enterprises and local government departments that fail to comply with the regulatory requirements of the EIA should be disclosed and reported on a regular basis; and
 - A corporate environmental profiles database should be established to facilitate the development of a corporate environmental performance and behavior assessment system. The environmental performance of enterprises should be assessed by the government on a regular basis, with the results made available for public inspection.

4.2.4 Recommendation 4: Develop a performance-based accountability system on green development at local government level

- 1) The performance of local officials should be closely monitored and based on consistent assessment and reporting criteria. Green development targets, specific indicators and incentives should be developed to motivate local officials to take proper account of their economic, environmental and social performance (index of economic growth, social progress, people's livelihood, protection of the ecological environment, etc.).

4.2.5 Recommendation 5: Increase public awareness on environmental protection, green development, and promote public participation

- 1) Greater transparency in environmental management and information disclosure, e.g. pollution emissions (amount and sources), pollution status and trends and details such as the nature, duration and location of pollution incidents;
- 2) More openness of the public feedback system for receiving comments and interacting with the community;

- 3) Public awareness building and education programmes at all levels and more effective use of media channels; and
- 4) Widespread promotional campaigns of low carbon lifestyle, energy-efficient behavior, and green development decisions at community level and in households.

4.2.6 Recommendation 6: Accelerate the green development process by means of pilot and demonstration projects

- 1) Set up pilot green development zones as demonstration areas for modern service sectors, hi-tech industries, sustainable energy and transportation systems, etc.;
- 2) Stimulate integrated economic, industrial and environmental policies and measures through the construction of industrial parks for achieving centralized emission control; and
- 3) The State Electricity Regulatory Commission (SERC) should initiate the installation of a “Smart Grid” in selected urban centres as pilot projects so that the efficiency of renewable energy could be explored and the benefits of demand-side-management (DSM) maximized.

4.3 Recommendations for Green Development in Eastern China

This study also sets out six specific recommendations to strengthen green development in the more developed part of Eastern China. They involve: the adoption of more stringent standards and targets; increased information disclosure; promotion of green consumption; provision of regional funds for pollution prevention and protection; establishment of a regional financial transfer payment mechanism; and promotion of corporate environmental governance.

The recommendations are based on the following rationales:

First, in view of the increasingly open market environment, Eastern China needs to adopt higher environmental and safety standards in the production life-cycle, with more innovative technologies or management techniques in order to enhance global trade competitiveness and respond to the growing public environmental awareness.

Second, it is the duty of the government to provide maximum information to the public, both in response to requests and by regularly publishing key information. With more information and data made available to the public, the cost of governance may be reduced and the interaction and communication between government and citizens enhanced.

Third, as there is an increasing impact of consumer behavior on the environment, with over-consumption being a major cause of waste and pollution, greater effort should be made to encourage more sustainable forms of consumption in the context of societal efforts to reduce emissions. As Eastern China gets richer, sustainable consumption should be given a high priority since consumers will be financially capable of paying more for environmental-friendly products and their behaviour will have a direct impact on the production patterns.

Fourth, the past 30 years of rapid development in Eastern China have created a massive amount of environmental risk to air, water, and to biodiversity. Citizens are exposed to these risks while it is often difficult to find the ‘polluter’ that caused or exacerbated the pollution. Therefore, regional funds should be set up to facilitate an integrated approach to environmental prevention and protection.

Fifth, the call for a holistic approach in regional co-operation hinges upon environmental protection efforts in less-developed areas. The provision of financial incentives would create a positive stimulus to more effective regional co-operation in environmental protection, ecological conservation, prevention of pollution transfers, and encourage co-development of areas at different levels of development.

Sixth, corporate enterprises have an increasingly important role to play in the society. They need to meet various environmental regulatory obligations laid down by the government and heightened expectations from the public with regard to their environmental performance. The promotion of corporate environmental governance should be given a higher priority in advancing green development.

Details of the recommendations are as follows:

4.3.1 Recommendation 1: Implement more stringent standards and targets

Adopt more stringent environmental standards and targets in Eastern China than national standards, e.g. impose more rigorous emission standards for key pollutants in industries that are energy-intensive and highly polluting.

Implement a performance management system at the local government level for evaluating achievements in carbon emission reduction and energy-saving.

4.3.2 Recommendation 2: Establish greater information transparency

Disclose information more widely and regularly to facilitate public monitoring, in particular:

- information that concerns most citizens, e.g. data on particulate matter emissions (PM_{2.5} etc.), ground-level ozone, and heavy metal emissions that would have a marked effect on human health; greater transparency in environmental management and information disclosure, including the amount and sources of pollution emissions, pollution data and trends and details such as the nature, duration and location of pollution incidents; and
- information and data that are fundamental for research and development and policy-making.

4.3.3 Recommendation 3: Promote green consumption

Advocate “green consumption” concepts and behavior by means of:

- voluntary actions through raising environmental awareness and information sharing to instigate behavioural change; and
- the introduction of taxation measures (e.g. environmental taxes and resource taxes) to promote positive changes in corporate and consumer behavior, and enhance the market competitiveness of environmentally friendly service and products.

4.3.4 Recommendation 4: Set up a regional fund for environmental protection and pollution control projects

Set up a pilot “Regional Fund for Environmental Pollution Prevention and Protection”, that can facilitate:

- the assessment of environmental health risks (e.g. hazardous chemicals left behind by former industrial plants which have led to soil and groundwater contamination);
- industrial brownfield site decontamination / detoxification / remediation;
- compensation to and resettlement of affected persons; and
- the provision of funding for local environmental protection and pollution prevention projects.

4.3.5 Recommendation 5: Establish a regional financial transfer payment mechanism

Establish a regional financial transfer payment mechanism, in order to:

- promote environmental protection in less developed areas; and

- encourage co-development initiatives between neighbouring regions.

4.3.6 Recommendation 6: Promote corporate environmental governance

Promote corporate social responsibility and green corporate governance through the establishment of green business coalitions and development of green supply chain management strategies.

5 Future Research Agenda

Several areas related to this study have been identified for future research work:

- An in-depth study focusing on the institutional barriers to policy integration for environmental protection and green economic development, including how the current system operates and where the blockages are;
- A correlation study between environmental quality and health impacts and related policy implications (e.g. land-use planning, urban design, public health policy etc);
- Case studies for assessing the relationship between air / water pollution and the loss of biodiversity at the local and regional levels (with case studies);
- A feasibility study of using shale gas as an interim replacement for coal, focusing on gas exploration, storage, transportation and consumer usage. The medium-term energy policy should be formulated in the light of shale gas availability nationally and globally;
- Detailed studies of business decisions regarding location and investment in the course of economic restructuring / green transformation in China. Data should be collected on what actually makes companies in different sectors, and of different types, sizes and cost structures, locate in different regions and move around, i.e. the influence of different factors, (e.g. environmental costs, land and labour costs, and external economic environment etc.). It is also important to know more about the investment incentives offered by localities (e.g., provinces, cities, counties) to attract industry and how consistent these are and how they relate to national priorities and guidelines; and
- The CCICED as a high-level advisory body to the Chinese government should consider setting up a Special Task Force to bring together experts from industry, government and academia to carry out integrated studies on climate change and energy policies targeting both local and regional development contexts. The studies should be regularly reviewed and updated for designing long-term sustainable energy and industrial development strategies and action plans.

China's Marine Environmental Management Mechanism - Based on Case of Bohai Oil Spill

FOREWORD

Although an important part of the marine economy, offshore oil and gas exploitation and transportation also can result in marine oil spill accidents. Tankers and offshore oil production may result in particularly large oil spills.

The subsea oil leakage accident of Penglai 19-3 oilfield in the Bohai Sea of China in 2011 has revealed the inadequacy of the emergency response capacity, an uncoordinated institutional arrangement and the weakness of the support system. In addition the accident has highlighted deep-rooted conflicts between China's marine economic development and the environmental management of the oceans. CCICED approved this Special Policy Study on the Bohai Oil Spill as a Case for China's Marine Environmental Management Mechanism. The study is to: promote sound interaction between marine development and environmental protection, facilitate green transformation of the "blue economy" development mode, and explore the new mode of environmental management, i.e., "environmental protection under development, and development under environmental protection". The need to harmonize marine resources development and marine environmental protection has become an urgent problem for China. In this regard, the Bohai Oil Spill accident has provided a classical case study for improving marine environmental management mechanism and facilitating "green transformation" of integrated land and marine economy.

China's offshore oil development began in the 1960s, and international cooperation began in the early 1980s. Over the past 20 years, China marine oil spill accidents have been characterized as high risk, wide damage range, long lasting and difficult to evaluate. With ever expanding offshore oil development, the Bohai Sea has become the main offshore area for oil production, with 21 offshore oil fields with 178 drilling and production platforms by the end of 2009. In total there have been 1419 production wells completed in this area¹. The annual oil production reached 30 million tonnes in 2010², which makes the Bohai Sea a prolific production area. In

¹ CCICED, *Ecosystem Issues and Policy Opinions Addressing Sustainable Development of China's Ocean and Coast* (2010), p33.

² Guo Xiaozhe, *World Offshore Petroleum Development history*, Petroleum Industry Press, Beijing, 2012, p337.

addition to the Bohai Sea, oil production in the East China Sea and the South China Sea is also expanding. All these activities lead to increasing risks of oil spill accidents.

In recent years, more than 500 marine oil spill accidents happen every year with a trend of further increase. Moreover, China's offshore oil transportation is only exceeded by that of USA and Japan at present, oil throughput of ports is increasing at a rate of more than 10 million tonnes/year³, shipping intensity is increasing, and the size of tankers is becoming larger. China's current marine-based economy is increasing at an average annual growth rate of more than 20%, which will surely increase the risk of marine oil spill accidents.

For China's current marine development and environmental protection situation, we can learn from the experiences and lessons from many oil spill accidents in the world, including the emergency response to the explosion and oil spill accident of the US "Deepwater Horizon" drilling rig in the Gulf of Mexico in 2010 and the oil spill accident of Norwegian "Statfjord" field in the North Sea in 2007. Drawing on these experiences will help strengthen and improve China's current marine environmental management.

This study aims at revealing the existing institutional, systematic and legislative problems in both emergency response and normal management of China's marine environment through the case analysis of the "Bohai Oil Spill in 2011" and the comparison of international lessons/experiences of marine environmental disaster emergency response. The study lays out practical policy recommendations on environmental management for a coordinated approach to marine economic development and marine environment protection.

1. MARINE ECONOMY DEVELOPMENT AND THE CHALLENGE OF MARINE ENVIRONMENTAL PROTECTION IN CHINA

1.1 Marine economy development is accelerating while marine development strategy needs to be improved in China

1.1.1 China has a solid foundation for marine and coastal economy development

³ CCICED, *Ecosystem Issues and Policy Opinions Addressing Sustainable Development of China's Ocean and Coast* (2010), p18.

China is a country with substantial land and sea areas. There are 380,000 km² of territorial sea area, about 3 million km² of the sea under national jurisdiction⁴, a 32,000 km coastline (including 18,000 km mainland coastline) and more than 6,900 islands⁵. China's more than two thousand years of historical experience with economic development shows that coastal development and overseas trade have been important components of the national economic development. Historically, the prosperous periods of country unity and social economic development were all accompanied by opening of coastal economic development and increases in overseas maritime trade. With national economic development and increasing international economic linkages, China's economic activity has shifted gradually from inland to coastal areas.

1.1.2 National marine economy development strategy is being implemented

At the present stage, China is a country at a strategic period of national rejuvenation and stable economic development. Coastal and marine economic development has broad prospects, further boosted by China's constantly strengthened awareness of marine economic development strategies. In 2003, the State Council issued the *Outline of National Plan for Marine Economy Development*. The *Eleventh Five-Year Plan (FYP) for National Economic and Social Development* in 2006 further elaborated the strategic directions as "strengthening ocean awareness, safeguarding marine rights and interests, protecting marine ecology, developing marine resources, implementing comprehensive marine management and promoting marine economic development". In particular, the 5th plenary session of the 17th CPC Central Committee in October 2010 put forward a detailed marine economic development strategy, namely "adhering to integrated land and sea area plan; formulating and implementing marine development strategy; improving marine development, control, and comprehensive management ability. Scientifically planning marine economic development; developing industries such as offshore oil and gas, transportation and fishery, etc.; rationally developing and utilizing marine resources; strengthening construction of fishing ports; and protecting island, coastal zone and marine ecological environment. Guaranteeing safety of sea transportation channels; and safeguarding China's marine rights and interests." In Chapter 14 of *Promote Marine Economy Development*, the 12th FYP (2011-2015) provided specific tasks for China's

⁴ Yang Jinshen, *China's Maritime Strategy Study Collection*, Ocean Press. Beijing, 2006, p271.

⁵ Working Group on Legislative Affairs of the NPC, *People's Republic of China Law of Island Protection Interpretation*, Law Press. Beijing, 2010, p165,182.

marine economic development in the future.

1.1.3 The marine economy plays an important role in the national economy

Since the 1990s, the status of the marine economy in the national economy has steadily improved, and has become an important pillar of development of the national economy. According to data from the State Oceanic Administration (SOA), total gross marine production reached 2.1 trillion yuan in 2006, with a year-on-year growth of almost 14%, and accounts for 10% of GDP; this number increased to 4.6 trillion yuan in 2011, with a year-on-year growth of 10.4%, and takes up 9.7% of GDP. According to predictions from the Marine Development Strategy Research Institute of State Oceanic Administration, the proportion of China's marine economy will further increase at least until 2020⁶.

1.1.4 Future marine economic development strategy needs to be adjusted

Compared with marine development strategies and marine economy development measures of other marine powers in areas such as North America, European Union, East Asia and Oceania, there are still some deep-rooted problems for China's marine economic development.

First, there is a lack of orderly arrangements at the strategic level for marine economic development. The existing coastal economic strategy is derived simply by adding up the various regional strategies. There is a lack of a clear marine economic development strategy, policies that can harmonize development and protection, and policies that integrate the terrestrial and marine economy.

Second, marine development activities in the coastal provinces are carried out simply as an expansion of extensive land-based economic development towards the sea. This has led to overcrowded coastal zones and environmental quality degradation in the nearshore waters. In contrast, full development of the Exclusive Economic Zone (EEZ) and deep and high seas has yet to be undertaken.

Third, leading enterprises and industrial clusters of traditional marine industries tend to be "marginalized" and are losing out in the global economic competition.

⁶ China Institute for Marine Affairs, *China's Maritime Development Report (2010)*, Ocean Press. Beijing, 2010, p226.

Fourth, China's marine economic development needs to address international relations with surrounding countries in terms of disputes concerning islands and jurisdictional boundaries. These disputes impose unprecedented challenges on further marine development. The competitive development of involved countries brings an ever-increasing uncertainty for marine environmental protection, and risk of environmental disasters.

Historical experiences and realistic outlook of national economic development has demonstrated that marine economy development is a strategic choice for medium and long-term development of China. High economic growth over the past 30 years has laid a solid foundation for future marine economic development. "Top-down" and "bottom-up"⁷ marine economic development strategies have set the stage for marine development as the predominant direction of economic development in coastal areas.

1.2 Marine environmental problems are emerging and getting worse

1.2.1 Significant negative environmental effects of marine industry development

Generally, compared with countries with a developed marine economy, China's marine economy is still in the early stage, and the marine industry structure is still dominated by secondary industry. The added values of the primary, secondary and tertiary marine industries in 2011 accounted for 5.1%, 47.9% and 47.0% respectively among the total marine output value.⁸ The three leading industries, i.e., marine fishery, marine shipping and transportation industry, and coastal tourism, all belong to the labour and capital-intensive traditional industries. The shipbuilding industry, marine engineering industry, marine oil and gas industry and marine petro-chemical industry, as well as second-tier industries, also mostly belong to the capital-intensive industries, where technological innovation abilities are lower than the international advanced level. Marine biological medicine, marine power and mariculture industries have developed rapidly in recent years, but their proportions are relatively low, and it will be difficult for them to become leading marine industries in the near future.

⁷ "Top-down" here refers to the national strategy of strengthening the country by guiding coastal provinces and cities to develop the coastal and marine economy. Meanwhile, "bottom-up" refers to coastal local economy entities spontaneously developing marine economy-related plans and to upgrade the plans within the context of a national marine development strategy.

⁸ SOA of China, *Statistical Bulletin of China's Marine Economy (2011)*.

Table 1. Environmental Effects of China's Marine Industry Development⁹

Marine Industries	Relative Growth	Environmental Impact	Degree of Environmental Impact
Marine fishery	++	Loss of marine ecological system	++
Marine oil and gas	+++	Oil spill pollution	+++
Marine mining	++++	Seabed (coast) damage, seawater pollution	++
Marine salt industry	+	Coastal land occupation	++
Marine chemical industry	++++	Pollution discharge to ocean	+++
Marine biological medicine	++++	Pollution discharge to ocean	++
Marine power	+++	Coastal (wind power) land occupation	++
Seawater utilization	++++	Possible pollution discharge to ocean	+
Marine shipbuilding	++++	Coastal land occupation	++
Marine engineering construction	+++	Coastal land occupation	++
Marine transportation	++	Emission to ocean and air	+++
Marine tourism	++	Tourism garbage	++

Environmental problems brought about by different marine industries varies due to differences in industrial scale and technical levels. Especially for the large-scale traditional industries and the rapidly developing medium-scale industries¹⁰ their operation can become main sources for marine environmental disasters. For industries such as tourism, fishery and shipbuilding, which are relatively small scale activities, the disaster potential is lower. However, their production and service facilities are generally outdated, and their environmental awareness, responsibility and capacity for handling environmental problems are relatively low. Although marine transportation, offshore oil, and marine chemical industries are relatively large-scale and are in a strong position in the Chinese market, their awareness of marine environmental obligations and emergency prevention/handling capacities can still be improved.

1.2.2 Increasing environmental pressure from spatial layout of the marine economy

Spatially, almost all coastal provinces have become "national-level" marine economic or coastal economic zones. In addition a number of sub-provincial strategic new zones such as Hengqin, Pingtan, and Zhoushan have been appointed. This makes regional marine economy development initiatives increasingly rise to the level of a

⁹ According to data in *Statistical Bulletin of China's Marine Economy (2011)* issued by SOA of China, some descriptions in *Marine Environment Bulletin of China (2011)*, and other related references.

¹⁰ Large-scale traditional industries refer to marine transportation, marine fishery and marine tourism, which have not developed quickly. Medium-scale industries refer to offshore oil and gas, marine shipbuilding and marine engineering construction.

“national activity”, and will surely result in greater tensions between coastal economic development and marine environmental protection.

China's major marine economic activities are located in and around the Bohai Sea Economic Zone, the Yangtze River Delta Economic Zone and the Pearl River Delta Economic Zone. Among these three zones, the Bohai Sea Economic Zone is the largest and its growth in recent years is still relatively strong (Table 2). Its marine economic activities are dominated by resource-intensive and labour-intensive traditional industries, which generate relatively large pressure on shoreline space and the marine ecological environment. In addition, some large coastal industrial parks and engineering construction projects are not included in the statistics, e.g., the "coastal new city" in Tianjin. These construction activities occupy and destroy valuable natural coastline and offshore space, and impose long-term threats to the water quality.

Taking into account the cumulative land source pollution over the years due to inland economic development, the Bohai Sea can hardly sustain greater environmental impacts from future coastal and marine economic development. The Bohai Sea therefore warrants "special attention" in terms of a more sustainable marine economy and improved environmental governance. Furthermore, the more vulnerable coastal areas often face greater pressure from land reclamation that will result in loss of coastal wetlands and mud flats, loss of biodiversity, and aggravated regional marine disaster risks.

Table 2. Major Marine Economic Activities Distribution and Environmental Impact

Marine Economic Zone		Around-Bohai Sea Economic Zone	Yangtze River Delta Economic Zone	Pearl River Delta Economic Zone
Proportion of gross marine production in national total (%)	2008 ¹¹	36.1	32.3	19.6
	2009 ¹²	37.6	29.6	20.7
	2010 ¹³	34.5	31.4	21.6
	2011 ⁸	36.1	30.1	21.5
Year-on-year growth (%)	2008	0.1	-1.4	0
	2009	1.5	-2.6	0.5
	2010	-0.1	-0.6	0.9
	2011	1.1	-1.9	0.6
Major marine industry		marine transportation, fishery, coastal tourism, oil and gas	coastal tourism, marine transportation, shipbuilding and fishery	coastal tourism, marine transportation, oil and gas and fishery
Marine environmental impact		Relatively heavy pollution from land-based	Medium pollution from land-based sources;	Relatively light land-source pollution;

¹¹ SOA of China, *Statistical Bulletin of China's Marine Economy (2008)*.

¹² SOA of China, *Statistical Bulletin of China's Marine Economy (2009)*.

¹³ SOA of China, *Statistical Bulletin of China's Marine Economy (2010)*

	source; high density of industry activities in shoreline and sea area; and large marine environmental pressure	relatively high density of industry activities in shoreline and sea area; and relatively large marine environmental pressure	relatively high density of industry activities in shoreline and sea area; and relatively large marine environmental pressure
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The existing marine economic development mode is characterised by the traditional land-based economic development and individual industrial sector development mode. This is not compatible with the requirement of modern-day marine economy development, which demands overall coordination, integration and open interaction among stakeholders. The current development mode neglects stakeholder's concerns about the protection of the marine ecological environment. The results are increasing destruction of coastal resources and problems with near-shore pollution.

1.3 Marine pollution in the Bohai Sea is serious and characterized by combined pollution sources

The Bohai Sea drainage basin includes seven major river systems: the Yellow, Haihe, Luanhe, Dalinghe, and Liaohe Rivers, plus the Shandong Peninsula water system and the Liaodong Peninsula water system. The semi-enclosed character of the Bohai Sea limits the exchange of water with the Pacific Ocean. The competition for marine resources, and the fragmented and haphazard development of various marine activities have resulted in environmental degradation over large parts of the area. At present, environmental pollution in the Bohai Sea is very serious with increasingly contaminated near-shore areas. The main pollutants are nutrients and petroleum.

The marine biological quality monitoring results from 37 sampling points in the Bohai Sea during 2010 show that the pesticide hexachloro-cyclohexane (Soprocide), DDT and PCB all comply with the Class I of marine organism quality standard. The percentage of compliance with the Class I standard for total mercury, petroleum hydrocarbon and cadmium are 92%, 73% and 68% respectively. The residual level of hexachloro-cyclohexane and PCB in shellfish in Liaodong Gulf has been decreasing continuously for the past three years¹⁴. The residual level of petroleum hydrocarbon and lead in shellfish from the Bohai Gulf (an alternative name for the Bohai Sea) has, however, been increasing over the last three years, while the residual level of cadmium has continuously dropped over the last three years. Even so, the status of the ecosystem in the Bohai Sea is still unhealthy. In terms of pollution types, it can be seen that environmental pollution in the Bohai Sea has gradually transformed from

¹⁴ North China Sea Branch of SOA, *Marine Environment Bulletin of North China Sea (2010)*.

single industrial pollution featured by oil and heavy metals, towards combined pollution of industrial, domestic and agricultural non-point source pollution.¹⁵

1.4 Marine pollution in the Bohai Sea is dominated by land-based pollution, with an increasing proportion of ocean-based pollution

1.4.1 Total pollution discharge from land-based sources remains high and marine function of some areas is seriously damaged

In 2010 and 2011¹⁶, the compliance rate from pollution sources along the Bohai coast was only 46% of all the sources monitored. According to the monitoring results of total pollutants discharged into the sea from main rivers in 2010, more than 70% of the pollutants are discharged into sensitive marine functional zones, resulting in a water quality compliance rate of 79.8%, 68.5% and 58.8% for nature reserves, tourist areas and fishery areas respectively. The sediment contamination in key areas is severe, especially for mercury, lead, arsenic, copper, petroleum hydrocarbon and DDT. Meanwhile, shrinkage of wetland areas and reduction of fresh water into the sea from river basins has resulted in seawater intrusion in the Bohai region in Liaoning and Shandong Peninsula Coastal Region of up to 1300 km². This represents 90% of the total national seawater intrusion area¹⁴. Furthermore the contribution of large quantities of nutrients from terrestrial sources to the sea is one of main causes of frequent offshore red tide and green tide disasters in China¹⁷.

1.4.2 Sea-based pollution is increasing and the overall pollution is getting worse

Marine ecological environmental disasters are frequent. In 2010, 69 outbreaks of red tide was observed in all Chinese sea areas¹⁸, covering a total area up to 10,892 km², including 7 times in the Bohai Sea with a total area up to 3,560 km² (mainly from *Noctiluca scintillans* and *Cryptomonas* outbreaks). In 2011, outbreaks of red tide occurred 13 times in the Bohai Sea¹⁹, with an area of about 217 km².

Seasonable increase of atmospheric pollution deposition in certain sea areas.

¹⁵ CCICED, *Ecosystem Issues and Policy Opinions Addressing Sustainable Development of China's Ocean and Coast* (2010), p31.

¹⁶ North China Sea Branch of SOA, *Marine Environment Bulletin of North China Sea* (2011).

¹⁷ CCICED, *Ecosystem Issues and Policy Opinions Addressing Sustainable Development of China's Ocean and Coast* (2010), p21.

¹⁸ SOA of China, *Marine Environment Bulletin of China* (2010).

¹⁹ SOA of China, *Marine Environment Bulletin of China* (2011).

The monitoring result of atmospheric pollutant settlement in the Bohai Sea area in 2010 shows that atmospheric dry deposition of pollutants in the Bohai Sea in spring and autumn is higher than that in summer, and atmospheric wet deposition flux is higher in summer than in spring and autumn. Among 11 kinds of pollutants being monitored, ammonium salt and nitrate are relatively high. For heavy metals, zinc is relatively high in the Bohai Strait and eastern sea area of the Liaodong Gulf, zinc and cadmium are relatively high in the Bohai Gulf and the Laizhou Bay sea area¹⁴. In 2011, atmospheric pollutant wet deposition in the Bohai Sea is predominantly by nitrate. The maximum wet deposition of inorganic nitrogen appeared in the Tanggu monitoring station ($11.0 \times 10^3 \text{kg/km}^2 \cdot \text{a}$), and maximum heavy metal as copper appeared in the Tanggu monitoring station ($4.9 \text{kg/km}^2 \cdot \text{a}$), and maximum lead appeared in Yingkou Xianrendao monitoring station ($0.7 \text{kg/km}^2 \cdot \text{a}$).

The eutrophication situation is getting worse. In the most recent ten years, compared with the last century, the outbreaks of red tides has increased in frequency and total area affected by such blooms have gone up. The main source of such blooms of toxic microorganisms is pollution generated from human activities.

1.5 Intensifying conflicts between economic development and environmental pollution in the Bohai Sea

1.5.1 Frequent oil spill accidents degrade the marine environment

Ocean oil spills can cause serious damage to biological resources, and thus are regarded as the most important pollution threat in the sea. In 2010, there were 195 offshore oil gas platforms in operation in China¹⁸, in which the Bohai Sea is the largest marine oil area. Up to 2009, there were 21 offshore oil and gas fields in the Bohai Sea with total 1,419 production wells and 178 offshore oil production platforms¹. On average, one oil spill accident happened every four days in China's coastal areas. From 1998 to 2008, 733 ship oil spill accidents occurred in the sea areas under China jurisdiction²⁰. On 16 July 2010, an oil pipeline of PetroChina Dalian Newport Oil Reserve had an accident involving an explosion and subsequent oil leakage. In June 2011, what was perceived to be a major oil spill accident happened in the Penglai 19-3 oil field on Bohai Bay. In addition, small oil spill accidents also happened in Bozhong 28-2 south oil field, Chengdaoxi A platform, Suizhong 36-1 oil field and Jinzhou 9-3 oil field¹⁹. In recent years, oil spill and oil leakage accidents due to oil and gas development activities have taken place frequently, leading to a large

²⁰ <http://news.sohu.com/20110707/n312681416.shtml>.

number of crude oil spills into the sea and causing serious impacts on the surrounding marine environment.

1.5.2 Increasing discharge of pollutants from marine oil and gas drilling areas continuously affect water quality

The main source of pollutant discharge from offshore oil and gas regions comes from production wastewater, drilling fluid, drillings and domestic sewage. In 2010, discharge amounts of production wastewater, drilling fluid, drillings, and domestic sewage from offshore oil and gas fields in the Bohai were $623.19 \times 10^4 \text{ m}^3$, $1.04 \times 10^4 \text{ m}^3$, $3.04 \times 10^4 \text{ m}^3$ and $12.05 \times 10^4 \text{ m}^3$, respectively. In 2010, seawater environment monitoring in the Bohai Sea (from 17 offshore oil and gas fields) showed that petroleum hydrocarbon concentrations in Jinzhou 21-1 oilfield area in the spring exceeded the Class I of sea water quality standard¹⁴. Although the petroleum concentration in other oil and gas fields has complied with the standard, which indicating obvious improvement compared with 2009, the overall water environment quality is not adequate. In 2011, monitoring results in 22 marine oil and gas regions (clusters) and in Bohai Sea show that the "Penglai 19-3 oilfield oil spill accident" had a serious influence on environmental conditions. The impacts of the "7.16 Dalian oil pollution accident" on the marine environment so far have not been fully eliminated; obvious petroleum pollution still exists in the marine environment, and its effects on Boshiwan beach and intertidal zone organisms still exists¹⁶.

1.5.3 Increasing instances of dumping of solid waste seriously affects the marine environment

Monitoring results in 2010 of the water and sediment quality, and in benthic communities, in five relatively large marine dumping areas in the Bohai Sea show that temporary dumping is not in compliance with the Class I seawater quality standards; and the dumping activities impacted water depth and submarine topography. For instance, water depth south of C1 temporary dumping area of Huanghua port has decreased to less than 60% of the original water depth¹⁴. In addition, wastes such as plastic bags and fishing nets are found in large volumes. In 2010, monitoring results of Gaolin Wanjia sea area near Huludao City show that the average density of submarine garbage (rubber pieces, plastic bottles, paint buckets, etc.) is about 313.8 kg/km^2 . The approved garbage dumping into the Bohai Sea in 2011 is 22.68 million m^3 , a 31.3% increase over 2010.¹⁶

1.5.4 Increasing pollution from aquacultures in the Bohai Sea increase the problems with eutrophication

Since 1990, China's aquaculture production has remained the largest in the world, and China is the only country in the world with aquaculture production higher than fishing production. At present there is a total of 226 seawater aquaculture areas in the Bohai Sea, taking up 16.8% of the offshore area. Intertidal mudflat aquaculture has the largest share, 4,240 km², accounting for 71.7% of the total area of aquaculture. Raft culture has the second largest culture area, 559 km², accounting for 9.5% of the total area¹⁴. The rapid development of aquaculture brings serious pollution to the sea. Research shows that 20% of the food input for cage culture is not eaten, thus becoming waste. Although the pollution discharge arising from marine culture operations only accounts for about 5 % of gross pollutant discharge into the sea, a large portion of the pollutants are nutrient substances, such as residual food and excrement that cause eutrophication of the surrounding water. This makes offshore aquaculture an important contributor to the occurrence of red tides.

1.5.5 Pollution from intensive ship and port operations seriously affects offshore aquaculture environment

In 2008, China had more than 240,000 ships with a total DWT of more than 70 million tonnes, ranking second largest in the world. China has 1,430 ports and 34,000 berths²¹. There are 79 ports around the Bohai Sea shoreline, at an average port interval of 65 km, of which there are 9 major ports with individual capacity of more than 200 million tonnes.²² Ports and ships are an important source of marine pollution. Ships docking at ports and various operations at ports will directly pollute the surrounding water environment. In addition, oil spills caused by ship collision/sinking, and wastes from ship dismantlement (residual oil, waste oil, oil sludge, oil-contaminated sewage, heavy metals, etc.,) pose a serious threat to marine and coastal environments. According to available statistics, 35% of marine environment pollution comes from ship oil spills²³. These pollution sources are a serious threat for development of near-shore and offshore aquaculture.

2. EXPERIENCES, LESSONS AND IMPLICATIONS FROM TYPICAL CASES OF MARINE OIL SPILL RESPONSES

²¹ Dinesh C. Sharma, *Pollution in Harbors are Attracting More Attention*, Environmental Health Perspectives in USA (Chinese Version), March, 2007, Vol. 115, No. 1c, p5-6.

²² http://www.idoican.com.cn/ido/paper/briefArticle.do?article=nw.D210200xsb_20110311_4-03.

²³ http://www.simic.net.cn/news_show.php?id=113965

2.1 Ineffective marine oil spill management and insufficient emergency response capacity in China

On June 4 and June 17, 2011, two oil spills occurred in the *Penglai 19-3 oilfield in the Bohai Bay*. It has been said that they caused seawater pollution around the oilfield and northwest sea, covering an area of several thousand square kilometres (non-compliance with Class I seawater quality standard) and a large area of sediment pollution. Exact figures are not quoted since there are various views about the extent.. However it has been suggested that some 870 km² of the sea area was severely polluted (the content of petroleum-based pollutants apparently exceeding Class IV seawater quality standard), which caused significant impact on marine ecology and fishery production. The accident investigation report from the State Oceanic Administration pointed out that the operator, ConocoPhillips China Inc. (COPC), violated the overall plan of oilfield development during its operation. There were defects and negligence in the safety of the operations, and preventive measures were not in place. This finally resulted in the Penglai 19-3 oil spills. In accordance with the Chinese-foreign cooperation contracts signed, COPC was the operator of this oilfield and therefore must take full responsibility for this oil spill accident^{24, 25}

2.1.1 Inadequate and late information disclosure

It took as long as one month for the information about the oil spill to be disclosed by relevant parties under media and public pressure. Furthermore, the State Oceanic Administration (SOA) only announced causes of the accident and did not publish any results for other investigations in time. On July 27, 2011, the North China Sea Branch of SOA started to publish updated information on the oil spill on its website.²⁶ So far, the basis of damage evaluation for marine ecology compensation and fishery losses and the content of the agreements reached between the relevant parties have still not been published. Due to the absence of systematic measures related to the handling of oil spill accidents in China, there is a lack of corporate social and environmental responsibilities at the part of the enterprises. This puts the public in an unfavourable situation with respect to information disclosure. In the Penglai 19-3 case, the relevant parties didn't disclose information related to the accident timely, actively and

²⁴[SOA, the Joint Investigation Group of PL 19-3 Oil Spill Accident Announced the Findings and Cause, November 11, 2011.](http://www.soa.gov.cn/soa/news/importantnews/webinfo/2011/11/1320551791757083.htm)[http:// www.soa.gov.cn/soa/news/importantnews/webinfo/2011/11/ 1320551791757083.htm](http://www.soa.gov.cn/soa/news/importantnews/webinfo/2011/11/1320551791757083.htm).

²⁵[SOA, Report on the Accident Investigation Process by the Joint Investigation Group of PL 19-3 Oil Spill, June 21, 2012.](http://www.soa.gov.cn/soa/news/importantnews/webinfo/2012/06/1339980559103721.htm)<http://www.soa.gov.cn/soa/news/importantnews/webinfo/2012/06/1339980559103721.htm>.

²⁶ <http://www.ncsb.gov.cn/oilspill/index.asp?pageno=8&pagesize=1>.

adequately according to relevant regulations in “*Regulation on the Disclosure of Government Information*”. This has caused widespread public criticism and undermined the credibility of the government. It also hindered the mobilization of all parties to timely respond to the accidents. In particular, it failed to enable fishery operators to timely control and minimize losses and collect evidences to be able to put forward damage claims.

2.1.2 Ineffective regulation and missing responsibilities

According to the SOA Joint Investigation Group there was a lack of self-regulation and environmental responsibility on the part of the COPC. Its petroleum production operation and reinjection of debris violated the overall development plan, and caused the spill as a result of a well kick (blowout). Furthermore, when signs of the accident appeared, operations were not stopped in a timely manner in order to investigate the cause of the pollution. This aggravated the extent of the pollution. In addition, the depth of the surface casing of this well was too shallow. This violated the requirements in the environmental impact assessment and undermined the emergency handling capacity, so additional leakage occurred²⁴.

There have been various comments about why information was not released in a timely fashion, and much finger pointing among the key players. In the Joint Investigation it was suggested that the COPC did not recognize the seriousness of the accident, and hid the truth through reporting false information and covering up mistakes. This caused continued oil spill and widespread pollution and aggravated damage. On June 4, 2012, another oil spill accident occurred in the Penglai 19-3 oilfield during the process of transferring crude oil and a small amount of oil was spilled²⁷. This indicated severe problems in the internal management of COPC.

China National Offshore Oil Corporation (CNOOC), as one of the central-level SOE and a main investor and partner of COPC in China, failed in performing the responsibility of direct supervision on its partner’s operation as required in accordance with “*Regulations on the Exploitation of Offshore Petroleum Resources in Cooperation with Foreign Enterprises*”. As the department in charge of the administration of environmental protection in the exploration and development of offshore petroleum stipulated in “*Regulations on the Administration of Environmental Protection in the Exploitation and Development of Offshore Petroleum*”, the SOA and its North China Sea Branch were unable to locate the oil spill in time in order to start the clean-up in the early phase of the accident. The Ministry of Environmental

²⁷ <http://www.ncsb.gov.cn/oilspill/file.asp?idnum=149>.

Protection (MEP) did not play an overall supervision and coordination role as specified in the “*Environmental Protection Law*”, and only participated in the joint investigation group. It has been suggested that the Ministry of Transportation (MOT) had responsibility for coordination.

Furthermore, the investigation group was led by SOA, a sub-ministerial body, which according to the regulations should coordinate other ministries. This misalignment of levels would certainly affect the effectiveness of the coordination. Up to now, SOA has not fully explained the issues of causality and coordination that increased the difficulty of handling the Bohai Bay oil spill accident. This also implies that the subject of liability related to the affected fishermen became more complicated. The scope and depth of the joint investigation led by SOA (with participation of seven administrative bodies and ministries) were insufficient. It lacked participation from the judicial department, People’s Congress, and the securities and state-owned assets management authorities. In addition, the relevant coastal provinces and departments did not actively engage in the accident handling (e.g., investigation, response and rights claim).

The main reasons for these failures are:

- *the interests of regulator and the enterprises are not separated but mingled;*
- *excessive bureaucracy prevented effective action;*
- *technology was out-dated;*
- *the number of agencies involved prevented effective regulation of the operation;*
- *weak regulations not clearly expressing the responsibility of the operator.*

Currently, the administrative supervision and management system neither clarify the liability of the responsible party nor foster an appropriate quality assurance system through imposing strong obligations.

2.1.3 Insufficient emergency response and slow reaction

a). Emergency response capacity was insufficient. The SOA does not have the ability of emergency response for marine environmental accidents; the remediation was mainly conducted by CNOOC and by renting vessels from industrial enterprises, while the Ministry of Transport, which has the oil clean-up capacity, was not directly involved. Since the authority in charge has no ability to mobilize emergency response,

while the department with this ability did not participate, the time of oil removal and recovery lasted from June to September. Meanwhile, the accident also revealed the weakness of some marine oil exploitation and drilling technologies in China.

b). Relevant parties did not act according to the corresponding emergency plans. According to regulations in the “*Execution Procedures of Oil Spill Emergency Response to Marine Oil Exploitation and Development*”, both the volume and area of spilled oil in this accident were classified as belonging to the Level I response standard, i.e., a significant environmental pollution incident. However, SOA did not start the Level I response procedures stipulated in *Emergency Plan of Oil Spill Accident of Marine Petroleum Exploitation and Development*, and the North China Sea Branch started only a Level III emergency response procedures. Moreover, losses in this accident exceeded RMB10 million yuan, which is classified as an extraordinarily significant environment incident. However, MEP did not start Level I responses according to the *National Emergency Response Plan for Abrupt Environmental Accidents* issued by the State Council. The State Administration of Work Safety (SAWS) did not start the *Emergency Plan of Accidents and Disasters of Marine Petroleum and Natural Gas Operation*.

c). Warning levels of emergency plans in different government levels and departments were inconsistent. Although there are corresponding emergency plans at all levels from national government to local governments and even to ports in China, they are not unified and coordinated. For instance, the warning level of oil spill from ships is inconsistent with that for oil spills originating from an oil platform; therefore, the final response efficiency is low.

d). There is a lack of a national emergency plan. The *Emergency Plan of Oil Spill Accident of Marine Petroleum Exploitation and Development* of the SOA is only a sectoral plan from a single department under the State Council. With the increasing expansion of marine oil exploitation and increasing impact on coastal fishery, tourism and economy by marine oil spill accidents, it is necessary to upgrade this emergency plan to a national level plan, or to formulate a national emergency plan for significant marine environmental accidents (including oil spill), so as to unify warning standards and classes, establish various levels of emergency response organizations, establish a smooth inter-departmental coordination mechanism, construct an emergency response infrastructure, and allocate emergency resources in a unified way.

2.1.4 Light punishment and low compensation

a). Penalties for violating laws and regulations to protect the environment too low. The SOA could impose only a RMB 200,000 yuan penalty on COPC in accordance with relevant provisions of the *Marine Environmental Protection Law*²⁵. In addition, there is no judicial intervention, and thus no criminal prosecution for significant environmental pollution crimes as stipulated in the *Criminal Law*. Considering the economic turn-over in the offshore oil industry a penalty of 200,000 yuan does not play a significant role either as punishment or deterrent in general.

b). Claims and compensation for environmental damages must be coordinated and payment made without delay. SOA claimed 1.683 billion yuan for marine ecology compensation and the Ministry of Agriculture (MOA) claimed 1.35 billion yuan of damages for fishery resources compensation. COPC paid 2.303 billion yuan of the total claim by SOA and MOA, while the remaining amount was paid by CNOCC. Furthermore, CNOCC has promised to pay substantial money for ecological compensation including research funding. However, civil claims have not yet been started. The civil claims from Shandong, Hebei and Liaoning have far exceeded claims by the central government.²¹

The current Maritime Environmental Protection Law is basically a single law for preventing marine pollution, with the main purpose of serving economic development. It lacks content needed for adequately protecting and improving marine ecological environment through compliance measures such as high fines and other claims²⁸.

2.1.5 Ineffective law enforcement and incomplete laws and regulations

It seems from the Bohai Sea oil spill that there is, in the normal management of marine resources, a lack of specifications of how to compile, review, approve, implement and supervise the operations in marine oilfields. The Environmental Impact Assessment (EIA) and environmental review system is not fully implemented during the process of developing an oil and gas field, and the environmental safety supervision and regulation on operating entities is deficient. From the discovery of the 19-3 oil field in 1999 to the accident in 2011, i.e. over more than 10 years, the company and relevant authorities have not tracked and evaluated the implementation of the overall oil field development plan. Proactive reporting from enterprises and disclosure of government information fell behind. The legislation on environmental information disclosure in China is incomplete and weak in actual operability. The supporting system of supervision, liability mechanism and remedy system for

²⁸ Wang Shuguang, *Marine Management in China*, Ocean Press. Beijing, 2004, p56-57.

protecting the public's right to know is also incomplete.

The existing legal basis related to assessment of marine oil pollution damage and claims for marine ecological environment in China is insufficient and there is no unified system for litigation procedures. There is also a lack of operability, resulting in confusion and difficulties in enforcement²⁹. Although the Marine Environmental Protection Law has identified the compensation system for ecological damages in principle, responsibilities for compensations for damages from marine oil spills have not been clearly defined, and the contents, procedures and standards of compensation as well as the rights and obligations between parties receiving compensation and parties paying compensation, are not specified. Besides, lower-level regulations on marine ecology damage compensation³⁰ have not been detailed, so the compensation for marine ecology damage is difficult to implement.

In 2007, SOA issued the ocean sector industrial standard *Technical Guidelines for Ecological Damages Assessment on Marine Oil Spills*, but it is not a regulation designed as an administrative penalty. Therefore, the standard could only be a reference for court decisions instead of the basis for litigation. In 2008, MOA took the lead in formulating the national standard of *Calculating Methods on the Economic Loss of Fishery Pollution Accidents*. In June of 2010, Shandong Province was the first to issue regulations related to marine ecology damages and compensation in China. Although the above regulations and acts identified the subjects to be compensated, the compensation standard was not explicitly defined (e.g., specific standards and fixed number of years of compensation, etc.) so the operability still remains to be seen.

2.2 Effective marine oil spill management system and rapid emergency response in the United States

On April 20, 2010, *Deepwater Horizon*, a drilling platform in the Gulf of Mexico, under the control of the BP Company suffered from an explosion and sank due to a burst of methane gas from the well. The accident killed 11 workers and injured 17 others, and more than 200,000 million gallons (about 750,000 m³) of oil spewed out

²⁹ China Institute for Marine Affairs, *China's Maritime Development Report (2012)*, Ocean Press. Beijing, 2012, p233.

³⁰ Lower-level law and upper-level law are the two basic categories used to differentiate the legal levels established in *Legislation Law of China*. The former is the derived law according to the principle and procedures, i.e., regulated by the latter. And the former needs to be subordinate to the latter, as clause 87 stipulates in *Legislation Law of China*. For *Marine Environmental Protection Law*, the laws related to marine ecology damage compensation belong to the lower-level ones.

of the well, contaminating a sea area of 1500 km². The oil leakage continued for 85 days. The full evaluation of the damages to the Gulf environment caused by this oil spill may take decades to carry out. It is clear, however, that the oil spill severely impacted the economic development of residents around the Gulf.

The main reasons for this accident involve three aspects: *(a) Weak self-supervision by the industry and lack of sufficiently robust technological safety mechanisms and procedures.* There were inadequate communications between the management systems of the various parties involved in drilling operation of the oil well, and inadequate risk awareness in decision-making. The drilling technology adopted was not the most advanced, with serious technical faults. At the critical moment operational safety procedures were not followed and serious mistakes were made. *(b) Weak government regulations failed to control the risk of explosion.* Minerals Management Service of the U.S. Department of the Interior was the supervisory organization for offshore crude oil development, and was accused of negligence in their management. The staff in the Minerals Management Service had no experiences of supervising deepwater drilling and did not receive relevant training, and in addition failed to follow the rules and regulations. The Service's risk assessment failed to keep up with deepwater drilling development. Besides, when the Obama administration announced that the "ban" on offshore oil exploitation in the Gulf of Mexico was lifted, no strict measures for supporting supervision were taken. No proper environmental assessment was performed when the offshore oil and natural gas drilling permit was issued. *(3) An imbalanced national energy policy has encouraged overdependence on oil and gas.* The US government over the past 30 years or more failed to make decisions on offshore oil exploitation and other domestic actions for energy security, leading to the situation where the current generation of Americans has become heavily dependent on external oil resources to an extent that threatens a way of life³¹. There was thus great pressure to produce this well at a high flow as quickly as possible.

2.2.1 Quick and effective emergency responses

a). Emergency response is quick. When an oil spill accident occurs, the US government initiates national, regional and local emergency command systems to unify and coordinate all departments in the effort to stop leaks, undertake treatment and recovery from an offshore oil spill. On the day of the explosion at the *Deepwater Horizon*, the US government started the national marine oil spill emergency response

³¹ National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Deepwater Report to President, January, 2011*, pp. 87-307.

system and established a local emergency command centre with the US Coast Guard (USCG) as the core body. The next day, the regional emergency group started to coordinate the federal Coast Guard, Department of Homeland Security, Department of Commerce and Department of the Interior, and to offer technical suggestions and assemble goods and materials from subordinate bodies and emergency response reserve station for taking preventive/remedial measures and performing search and rescue. On the third day, the national oil spill emergency response group was tasked with the responsibility of coordinating emergency preparations and handling pollution of oil and harmful substances, and a decision was made that the BP Company should be in charge of stopping leakage and oil clean up operations. Meanwhile, US Environmental Protection Administration (USEPA) experts provided guidance on oil clean up. The National Oceanic and Atmospheric Administration (NOAA) provided forecasts on the oil drift trajectory to help the clean up group adjust remedial measures according to weather changes.

b). Multiple technologies were used to remove and prevent oil leakage. At first, the BP Company assigned underwater robots to repair the safety valves and assigned ships to remove leaked oil, and drilled two new wells to relieve the pressure and reduce the rate of oil leakage. Although remedial technologies adopted are mainly conventional techniques during the remedial process, the final remediation effects were obviously due to the support of national marine oil spill emergency response system, adequate reserve of goods and materials, rational deployment and proper treatment.

c). Active participation of volunteers was encouraged. About 2,000 volunteers helped with oil clean up. BP Company set up a website for receiving suggestions from the public over the world. Tens of thousands of suggestions were received; some of them were classified as adoptable suggestions. The government recruited volunteers to clean up oil contaminations on birds and wild marine animals.

d). System reforms and remedial measures were actively promoted. President Obama established an independent committee to investigate this accident. Granting of new deep-water exploration permit was suspended for half a year, and those permits already issued were subject to re-evaluation to prevent similar accidents. The Department of Interior announced the separation of the National Mineral Management Service into three independent agencies, the Bureau of Ocean Energy Management, Bureau of Safety and Environmental Enforcement and the Office of Natural Resources Revenue. It is also planned to revise the \$75 million upper limit of an oil

company's damage compensation stipulated in the *Oil Pollution Act of 1990*, either to increase the upper limit, or not to have an upper limit. Moreover, the government actively intervened in the claim for compensation, and especially, the Department of Justice initiated civil and criminal investigations to force the BP Company to set up a \$20 billion compensation fund³³.

2.2.2 Complete emergency management system for marine oil spill

Problems in the oil spill emergency response³³.

The emergency preparedness was insufficient to actively respond to a large-scale deep-water oil spill. When the oil well exploded, the federal government was unable to monitor the containment of deep-water oil well, underestimated the amount of oil leakage which in turn resulted in poor implementation of measures, plans and analyses of oil well containment. In the absence of effective techniques to stop the blow-out, the BP Company used unproven measures to try to control the spill. A key technical problem was the blowout preventers which did not function properly.

In addition the massive use of oil dispersants might cause secondary pollution although it probably prevented shoreline contamination. About 7,000 tons of dispersants were used to treat the spilled oil. Some of those dispersants contained petroleum products with significant toxicity (Crystal Clear Oil Dispersant and kerosene). However, despite these problems, the emergency management system for marine oil spills in the US is effective.

The *Oil Pollution Act of 1990* provides a fundamental base for the establishment of an emergency response system for offshore oil spills. An emergency command and response systems for all levels (including national, regional and local levels) has been established. The US Coast Guard (USCG) has the role to make the final decisions on behalf of the government, to coordinate and with a responsibility to combine the administrative areas and districts. The USCG can initiate national emergency response plans and authorize coordination whenever necessary to facilitate communication among relevant national and regional authorities and the stakeholders involved. It plays a decisive and important role in carrying the national emergency response strategies forward.

A system of oil spill clean up funds has been established. The federal government has established a \$1 billion oil spill clean up fund, and could demand

accountability of the oil spill polluters. Meanwhile, a \$100 million oil spill clean up fund was established through legislations of various states. The main sources of the federal oil spill fund come from: 25 cents per barrel levied on domestic and imported crude oil; bank interest on the oil spill fund; damages paid by polluters for oil spills; penalties paid by polluters for oil spills; and money from other funds in an emergency situation. The oil spill fund is managed by the National Oil Pollution Trust Fund Centre.

The drilling and production operators are members of oil spill clean up associations. Such associations have been set up for mutual benefit to any operator in case of an accident. They maintain the stocks of equipment and has trained personnel on stand-by and will start operating immediately in connection with an accident. The specialized spilled oil clean up associations are non-profit organizations, and their main expenses and equipment cost are covered through membership fees paid by members including oil refineries and oil companies.³²

2.3 Effective marine oil spill management system and emergency response in Norway

On December 12, 2007, an oil spill accident happened when one platform on the Staffjord oil field in the North Sea in Norway pumped oil to the tanker Navion Britannia via pipelines. About 3,220 tonnes (24,150 barrels) of crude oil was spilled into the North Sea. This oil spill accident is the country's second largest ever³³. However, the emergency response was active and effective to a large extent due to the sound overall marine oil spill management system.

2.3.1 Effective marine oil and gas exploitation management system

Integrated marine oil and natural gas exploitation management system is implemented. In Norway, there are a number of Ministries involved in management of marine oil exploitation activities. The Ministry of Petroleum and Energy has the overall responsibility for exploration and exploitation activities; the Ministry of Finance is in charge of finance, including taxes; the Petroleum Safety Authority of the Ministry of Labour is responsible for operation safety; the Climate and Pollution Agency of the Ministry of the Environment is in charge of pollution discharge permit (including pollution prevention and response requirements); the Ministry of Health

³² Peter K. Velez, *Summary of the United States Offshore Oil Pollution Prevention and Response Regulatory Scheme*, August, 2012.

³³ <http://www.coes.org.cn/shownews.asp?id=101>.

and Care Service is responsible for workers' health; and the Coastal Administration of the Ministry of Fisheries and Coastal Affairs is in charge of the Governments' response system to oil spill accidents, including oil remediation. Although different agencies have specific division of responsibilities, the effective integrated management is carried out during the management of oil and gas development activities. In case of oil spill accident, the Petroleum Safety Authority will be notified by the Operator and report it further to the other Ministries³⁴

Pollutant discharging permit system for oil production is carried out. The oil company that has obtained the rights to conduct exploration and exploitation in a certain area of the continental shelf is required to apply for a pollutant discharge permit before starting its drilling operation. The pollutant discharge permit is issued by the Climate and Pollution Agency. It covers every activity of the company that may have an impact on the environment, including oil spill emergency plans and response requirements as well as all requirements to address environmental risks. The company has a constant obligation to review and revise its emergency response plan to accommodate actual conditions. The relevant departments (such as environment protection authorities) will conduct regular inspections of the operation of the company to ensure that its daily operations comply with relevant rules and regulations and special requirements in permits. This system emphasizes trust, communication and transparency between governmental departments and petroleum industries, and has been implemented for more than 30 years.³⁴

It is specified that the production company is responsible for accident prevention and emergency response. *Pollution Control Act* of 1981 is the legal basis of preventing and responding to oil spill accidents. It explicitly stipulates that those responsible for oil and gas exploitation activities bear the obligations for oil spill prevention and emergency response. It also requires that the developers whose activities might possibly cause contamination shall have necessary oil spill prevention and response plans to prevent, detect, stop, eliminate and limit impacts caused by pollution. The oil spill prevention and response plans shall be drawn up according to probability of pollution and extent of damage. A risk-oriented approach is adopted, which requires that all operators must have a prevention and response plan that always matches with the dynamic business risks.³⁴

³⁴ Per W. Schive, *Oil spill preparedness and response – Norwegian legislation and administrative arrangements regarding preparedness and response for accidental oil spill from offshore oil and gas activities*, July 2012.

2.3.2 The national marine oil spill management system must be improved

Emergency plans fully ensure the sharing of emergency response resources.

The petroleum industry, the municipalities and the Government all have prepared emergency plans based on environmental risks and oil spill emergency evaluation. The main principle is that the operators must have a well prepared and implementable oil spill emergency plan and all the necessary response resources to handle any oil spill situation caused by the offshore operations. Generally, they should have their own resources (trained personnel, oil booms, skimmers, vessels and other equipment) which could be used according to the emergency plans to handle the spill. They shall also be responsible for having guaranteed availability of any additional reserves of equipment resources and that these can be mobilized without delay in a worst-case situation. This may include resources owned by others or owned mutually, and available through agreements in the case of a major accident. If necessary, as the supervisory organization of oil spill incidents, the Coastal Administration could take over action management by laws and mobilize all available resources obtained from private and public departments as national prevention and response reserves. In addition, an advisory group consisting of representatives from government and public consulting entities may be established.³⁴

National oil spill prevention and emergency plan system functions well. The point of departure according to the Norwegian Pollution Control is that in the case of oil spill accidents caused by offshore oil and gas exploitation activities, the remediation of these accidents would be entirely under the responsibility of relevant enterprises. By law, these enterprises/operators must always have effective emergency plans in place. The municipal government shall have necessary oil spill prevention and response plans to cope with minor accidents that cause pollution. In addition, the Coastal Administration has the responsibility to provide for the necessary oil spill prevention and response plan at the national level to handle major pollution accidents (e.g., oil spills from ships) that are beyond the prevention and response range of municipal government or private companies. For fulfilling this responsibility the Coastal Administration needs to ensure that private sector, municipal and national oil spill prevention and response plans are compatible and coordinated.

Professional organizations for oil spill prevention and response has been founded. Relevant administrative authorities could require enterprises to found an independent professional oil spill prevention and response organization based on agreements. If there is no agreement, the pollution control authority could make a

decision on the cooperative organization for oil spill prevention and responses, and allocate the cost sharing among participants. As a result, the petroleum industrial enterprises have established the Norway Marine Cleaning Allied Company, responsible for managing the oil spill emergency plans. In addition, if the company's resources were insufficient, the oil companies can mobilize resources from this organization.

Furthermore, *public participation* is an integral part of effective implementation and enforcement of environmental laws and regulations. The public has the rights to know the results of work, inspections and audit reports of relevant departments.

2.4 Pay great attention to offshore oil spill management systems and accelerate the construction of an efficient and effective emergency response model

***2.4.1 Oil spill emergency response management system is clearly specified in relevant laws in foreign countries*^{35,36, 37}**

The legal contents are relatively complete. The laws cover the following issues: organizations and their responsibilities; funding sources; required prevention equipment and recovery system for oil spill; procedures and standards for oil spill disposal; penalty system; and regulations on use of dispersants. For example, the US *Oil Pollution Act of 1990* and Norway's *Pollution Control Law* mainly focus on the protection of natural resources. In contrast, in China's *Marine Environmental Protection Law*, relevant provisions are not clear or absent. The main purpose of the law is to promote offshore economic development.

Legislation is general and covers all types of incidents. In the aspect of legislative technique, advantages of Norwegian laws are features of statute law in the continental legal system of Germany. Norway's *Pollution Control Law* can be applicable to all kinds of pollution. Compared with the situation in China, where there are many complex and interrelated administration structures that result in confusion in practice, the Norwegian law only use one "pollution control authority". Therefore, any change of institutional arrangements will not impact the integrity and authority of the law. Norwegian regulations on oil management put environmental protection,

³⁵ Wang Zhugang, Dong Hua. *The Emergency Response, Disposal Measures and Revelations of Mexico Gulf Oil Spill in US*. The International Petroleum Economics. June, 2010, p1- 4.

³⁶ Yang Yufeng, Miao Ren, An Qi, etc., *The Causes Analysis of Mexico Gulf Oil Spill and It's Enlightenment and Suggestion*. Energy In China. August, 2010, Vol. 32 No. 8, p13-17.

³⁷ Wang Guanghui, Chen An. *Study on Mechanism for Handling Offshore Oil Spill Events*. Journal of Natural Disasters, December, 2011, Vol. 20 Suppl., p35-42.

health and safety into one framework, and achieve these three social goals by supervising industrial activities. To a great extent, prevention of oil spill in oil development is achieved by ensuring production safety, equipment safety and worker operations.

Rules and guidelines covers details to ensure its applicability. The legislative advantage of the US is the level of detail that is addressed. US laws and regulations, such as *Oil Pollution Act*, *Federal Water Pollution Control Act* and *National Oil and Dangerous Article Emergency Response Plan*, have detailed provisions and a rigorous logical structure. Their applicability is ensured through auxiliary provisions such as guidelines and rules.

China must improve its laws and regulations and their enforcement. At present, the industrial technical standards used as the basis of claims are weak, while associated clauses in *Marine Environment Protection Law* are too general. Therefore, China should take the oil spills in Bohai as a turning point to establish a more demanding and strict legal system. The US *Oil Pollution Act of 1990* can be used as a reference to establish a law for oil spill emergency response by the state and relevant departments. The upper penalty limit in *Marine Environmental Protection Law* should be increased or abolished, clauses relevant to determination of damage compensation should be added, and law-enforcing departments should be authorized to take the mandatory measures when needed. Clauses should be detailed to differentiate slight and severe damage behaviour, differentiate categories of pollutants, define and specify the land and sea area zoning department responsibilities so as to enhance the law enforcement operability. Because environment and resources have many values, environmental legal relationships have both public right and private right aspects; therefore, the environmental protection law should be advanced from administrative regulation law towards social law. A public participation mechanism needs to be set up, and corporate information disclosure obligations should be strengthened.

2.4.2 One responsible authority should be in charge of offshore oil spill emergency management with coordination and cooperation from other relevant departments in foreign countries^{35, 36}

In the USA, the USCG is in charge of supervising and responding to offshore oil spills. In Norway, the Climate and Pollution Agency of the Ministry of Environment is in charge of supervising environment pollution caused by offshore oil, and the Fishery and Coastal Administration is in charge of responses to accidents.

In China, the SOA is in charge of supervising and responding to offshore oil spill

from oil production platforms, and the MOT is in charge of supervising and responding to oil spills of ships. In China, offshore oil spill emergency response responsibility is divided by sectors, with the same function duplicated in various agencies. Such a situation is counterproductive to marine environmental protection.

By contrast in the foreign countries surveyed, authorities have good coordination for offshore oil and gas development and accident emergency management, and prevention and supervision of pollution is conducted by the responsible sectoral authority. In Norway, the Petroleum Safety Authority plays an important role in prevention and supervision of oil pollution. In the USA, the prevention of oil pollution is mainly supervised by the Environment and Safety Executive Agency. This arrangement shows the emphasis on industrial sector supervision and makes full use of industrial technologies, and tries to ensure industry's awareness of self-regulation. In Norway, the normal management authority for marine oil development is the environment protection authority, which exercises a "professional management" function, such as issuance of pollutant discharging permits for offshore oil development and approval of the use of oil dispersant. Such an arrangement is good for the uniformity of environment protection and reflects the "cross-sector" characteristics of environment protection. Certainly, this professional management is built upon a foundation of scientific monitoring data such as total amount of pollutants and chemical and biological characters of pollutants.

China must improve its emergency response mechanism. By establishing an integrated land and marine planning and coordination mechanism between ministries, cooperation and joint management can be developed and consolidated, so that enforcement of policies and laws can be better assured. A national level joint-action mechanism should be established with participation of many ministries. Stakeholders should share information through joint meetings in order to avoid overlapp, ensure simultaneous implementation of rapid spill clean-up; efficient investigation of accident causes, acceptance of public claim litigation, remedial plans, information disclosure etc. A special risk fund should be considered with main contributions from oil enterprises. For serious environmental accidents such as offshore oil spills, an inverted burden of proof can be considered, and civil litigation and punitive compensation mechanism can be introduced. Proactive information disclosure and accountability mechanism of responsible parties need to be established so that the enterprise and relevant functional departments actively will disclose any relevant information, and engage in the damage mitigation process. A third party supervision and monitoring mechanism should be established to clarify environment protection

responsibility of enterprises. An ecological compensation negotiation mechanism should be established to internalize the ecosystem damage activities, i.e., assess the value of marine ecological damages and let the liable party compensate the full cost of ecological damages. This effort will adjust relationships between environmental and economic interests, and will encourage environmental protection.

2.4.3 Foreign emergency response emphasizes efficiency and effectiveness^{35, 36}

Emergency management should be both efficient and effective. An efficient response should be implemented without delay. It should be built on a comprehensive emergency handling system under the leadership of an emergency response agency. Effectiveness refers to operations that minimize the impacts of accidents. The emergency response should be built on sufficient contingency resources in the form of containment and clean up techniques and well-trained support personnel. Relevant laws in foreign countries specify the emergency response mechanism, organizations, responsibilities and authority of emergency management. An effective and efficient authority that has centralized power, reliable capital guarantees, and unified leadership, should have the capability of organizing, coordinating and commanding. There are multi-level management mechanisms from national to local levels with command institutions and rescue powers at different levels. Factors such as type of accident, scale of accident, probability of occurrence and potential social and environmental impacts, should determine the hierarchical disaster management system. When an accident occurs, a response is triggered depending on the size and type of the accident and the potential threats to environmental and economic resources. The collaboration of non-government organizations and volunteers in response to a clean-up effort should be carefully managed in order to be meaningful and safe³⁸. Then the high efficiency of emergency response and the high benefits will be ensured.

China must develop an emergency response arrangement that will be able to respond immediately in the case of an accident. Currently, several governmental departments are involved in cases of oil spills offshore. An authority with overall responsibility for the situation must be appointed; emergency resources from the various departments should be integrated, and unified arrangements be made with clear distribution of responsibilities. The emergency disposal of minor offshore oil spills should be managed by the local and relevant departments according to different sectors. Drawing on US experiences, a national oil spill emergency response

³⁸ Gao Zhenhui, Yang Jianqiang, Wang Peigang, etc., *Theory, Method and Case Study of Ecological Damage Assessment of Offshore Oil Spill*, Ocean Press, Beijing, 2007, p389.

command system needs to be established in China, and cooperation among departments with overlapping functions should be strengthened to increase the response speed.

2.5 Improve China's offshore oil spill management system and improve the emergency disposal capability in a comprehensive way

2.5.1 Oil spill emergency management in several other countries is more efficient and effective

The national emergency plan usually takes the lead, and there are national and regional multi-level emergency command institutions whose responsibilities are identified according to the scale and range of the accident^{28, 29}. In general, foreign emergency response organizations can be divided into a management layer and an operational layer. The management layer is mainly responsible for commanding and coordinating the oil spill response, and the operational layer is mainly responsible for pollution clearing on site. Meanwhile, the national emergency response systems will have a standing body such as a 24 hour spill alarm institution and emergency response command centre with supreme decision-making power.

At present, China has established ship oil spill emergency response centres at various levels with the Rescue Centre of Maritime Authority of MOT as the main body, with a set of emergency measures of its own. The other key departments, such as the China Meteorological Administration (CMA) and MOA, are not incorporated into the overall emergency system, while SOA, CNOOC, PetroChina and Sinopec also set up their own offshore oil spill emergency centres. In some countries, the oil spill clean-up is conducted by professional clean-up companies, or by special institutions of the government, or by both. Oil spill clean-up is implemented in the form of contracts in US and in the form of prior contracts in Norway, and the operator uses their own equipment or rented equipment or contracts professional oil clean-up companies. Both USA and Norway have national emergency plans, while China only has ministerial emergency plans.

China should prepare a national special emergency plan for serious offshore oil spill accidents, and form a well-coordinated emergency response system operative at national, regional and local levels. The different regional emergency plans should be prepared according to the needs and local conditions of the different sea regions. Based on the multi-level preparedness principle, an emergency response capacity compatible with local, regional, national or international level oil spill

accidents should be formed at the various levels. Training and drill exercises must be carried out in an effective way so that personnel are well acquainted with the equipment and how to use it.

2.5.2 Foreign oil spill emergency management mechanisms are built on mutual agreements and cooperation

Both in Norway and the USA emergency response is based on the condition that the operator is responsible for both preparedness and response and that the company shall enter into prior agreements with pollution clean-up companies to guarantee that adequate pollution response is always available. Only when the accident is considered very serious, should the government get involved in the emergency response. The costs of pollution clean-up and environmental recovery can only be compensated by clearly identifying the responsibilities for compensation for such costs. The operator is responsible for emergency plan preparations, setting up of oil spill emergency teams and emergency response actions including training, equipment test, periodical drilling and emergency equipment inventory. This mode follows the “polluter pays” principle, and as a result, the person liable shall carry all emergency costs. This stimulates the enterprise to improve its prevention capacity, promote the development of an emergency response industry, and facilitate environment protection under a market framework. However in China, the government is mainly in charge of mobilization and organization, and the establishment of response-level principles and mechanisms. The enterprise is the person liable after an oil spill accident occurs, and the government supervises the oil spill emergency response.

The operator is required to immediately report the occurrence of oil spill accidents and the application of oil dispersant to the authority³². If violating the obligation of reporting, the operator will have to carry the administrative, civil and criminal responsibilities. The relevant authority is required to make relevant information available to the public. There also exist regulations in China that require government to disclose environmental information to the public. However, the scope of information disclosure is not specified. For instance, the public has no right to know the results of inspections and supervisions by the marine environment authority. This is different from practices in many other countries.

The ecological damage compensation system and oil clean-up fund system are well developed in US, which guarantee the resources needed for ecosystem restoration³². In the US, the natural resource damage compensation system, (similar

to the ecological damage compensation in China) was set up by the *Oil Pollution Act of 1990* and relevant laws, and an Oil Spill Responsibility Trust Fund was established according to *Internal Revenue Code of 1986*. In Norway, the *Pollution Control Law* stipulates the pollution damage compensation system, and *Oil Activity Law* stipulates the marine ecological damages due to offshore oil and gas exploitation in detail. In China, the national ecological damage compensation system (including management and utilization of ecological damage compensation fund) has yet to be set up. The only reference is the *Management Regulations of Collection and Use of the Ships Pollution Damage Compensation Fund* issued by the MOT in May 11, 2012³⁹.

In the foreign countries studied, besides emergency response by professional clean-up companies, great attention is paid to civil and social participation in supervision and actual pollution cleanup, which fully ensures the public's right to know and right to participate. The public participation is good for promoting the nationwide environment protection awareness, as well as motivating the practice of environment protection. However, the safety of such volunteers must always be a priority.

*With respect to research and technological innovation related to oil spill preparedness and clean up, Norway mainly takes advantage of continuous investment from oil and gas enterprises and entrusts the research institutions and universities to carries out relevant research*⁴⁰. As a result the offshore oil spill emergency management system is highly risk averse, and its emergency system is effective and efficient.

3. MARINE ENVIRONMENTAL MANAGEMENT ISSUES AND SOME ROOT-CAUSES IN CHINA

3.1 Marine environmental management in China is outdated and must be improved

3.1.1 Many departments are involved in marine environment management, without strategic planning and overall coordination mechanism, and the overall

³⁹ http://www.gov.cn/zwqk/2012-05/28/content_2147033.htm.

⁴⁰ Guo Xiaozhe, *World Offshore Petroleum Development history*, Petroleum Industry Press, Beijing, 2012, p175-176

*efficiency is low.*⁴¹

The *Marine Environmental Protection Law* stipulates that governmental agencies with sectoral responsibilities related to the oceans should protect the marine environment as a priority in their daily operations. According to this provision, MEP is in charge of providing guidance, coordination and supervision on issues related to marine environmental protection. SOA is responsible for investigations, monitoring and assessments. MOT is in charge of pollution management and prevention as it relates to ships and ports. MOA is responsible for offshore fishery resources and environmental conditions in waters of importance to fisheries. Environmental protection agencies at the provincial, municipal and county-levels along the coast are responsible for providing guidance, coordination and supervision of local marine environmental protection. However, the present situation means that there are a number of barriers between higher and lower administrative levels and between different departments and regions. This has led to a situation where important aspects are not managed by any agency while there are overlaps in other areas.

The monitoring of seawater quality may be taken as an example: SOA, MOA and MSA all have their individual monitoring systems and data gathering arrangements. For some other concerns, no agency carries out any implementation of the regulations due to the lack of an inter-ministerial coordination agency and regional and a cross-sectoral joint-efforts mechanism. Multi-department management itself does not inevitably result in administrative inefficiencies. However, the lack of an overall strategy, oversight, and effective coordination between departments creates administrative inefficiencies. At present China's marine environmental management displays many such weaknesses.

Currently, there are two main forums for inter-ministerial joint coordination to achieve environmental protection in China. ***These are the Inter-ministerial Joint Meeting of National Environmental Protection led by MEP***⁴² and ***the Inter-ministerial Joint Meeting of the Bohai Sea Environmental Protection led by NDRC***⁴³. The former is a temporary authority coordinated by the General Office of MEP and supported by other related departments within MEP. It focuses on water pollution prevention in coordination with the Ministry of Water Resources (MWR) and the coastal provinces, but not on marine environmental protection. The latter is to

⁴¹ Xu Xiangmin, Li Bingqiang, et al. *Study on System Issues of Bohai Management Law*, People's Publishing House. Beijing, 2011, p1-26.

⁴² http://www.110.com/fagui/law_146722.html.

⁴³ http://www.sdpc.gov.cn/gzdt/t20110727_425564.htm.

promote the coordination required for strengthening the environmental protection in the Bohai Sea and for implementing the *Overall Plan of the Bohai Sea Environmental Protection*. However, with the present management set-up, MEP has not been able to implement its statutory management function for integrated supervision of China's marine environment in the above two forums.

In March 2012, MEP and SOA signed a framework agreement on the *Communication and Cooperation Mechanisms in Establishing Marine Environmental Protection* and decided to strengthen cooperation in marine pollution control and marine ecological protection of marine areas in order to promote coastal and marine economic development in harmony with the marine environment.⁴⁴ However, at present, there are no effective marine ecological regulation and control policies to promote the coordination of the marine economy and at the same time ensure environmental protection. As a result a number of acute marine environmental issues remain unsolved due to the lack of practical administrative regulations and departmental rules, and without corresponding technical standards at a level sufficient for effective protection of the marine eco-environment.

China lacks an overall strategic plan for national marine development and marine environment.⁴⁵ Marine environmental protection must become a priority in China and no economic development in offshore areas or in coastal regions or important drainage areas should be allowed if it impacts the marine environment. The government must develop operational strategies based on scientific information, that both achieve marine development in coastal and offshore areas and at the same time protect the marine environment. The productivity and biodiversity of China's marine environment can only be preserved for coming generations if laws and regulations set up to protect the environment are followed. Since the start of the 12th FYP period (2011-2015), the State Council and related ministries have issued many measures, such as *The 12th FYP for National Economic and Social Development of the People's Republic of China*, *The 12th FYP Environmental Protection Program*, *The 12th FYP for National Marine Science and Technology Development*, and *The 12th FYP for National Marine Environment Monitoring and Estimation System*. However, none of these can be considered as the overall strategic plan of China's marine development and marine environment.

⁴⁴ http://www.lrn.cn/media/seanews/201003/t20100315_471876.htm.

⁴⁵ Tang Baiping, *Study on the Legislative System of Marine Resources Protection*, Law Press. Beijing, 2008, p218-221.

The marine-related environment laws are not fully consistent with the “Three Provisions” (State Council Regulation on Government Organization and Functions) about marine environment management and the functional division of responsibilities issued by the State Council. China has two laws related to marine environment, *Environmental Protection Law* and *Marine Environmental Protection Law*. The former is the fundamental law for China’s environment management, while the latter is a specialized law for marine environment. The relation between the two laws is the same as that between other fundamental laws and special laws. The two laws establish a management system that is built on a unified supervision of the marine environment in combination with individual responsibilities in different departments.

Based on these two laws, the State Council stipulates “*Three Provisions*” for departments involved in marine environment management. However, the overall and unified supervision and management duties are not clearly defined for specific work and responsibility (Table 3). The result is a lack of overall coordination related to marine environment management. The barriers at different levels and between regions have not been resolved and marine environment problems increase. The normal practices in national marine environment management have been very sector-specific and unable to solve inter-departmental and cross-regional marine environment problems. As a result the statutory unified supervision and management department of marine environment in MEP was able to do little to react to the serious marine environment accident. The total pollution control from offshore activities and land-based sources has not been effective.

There may be three options for solving the problem. The first option, ideally, is to assign marine environment management to MEP, as well as other management functions related to the aquatic environment, rural environment, and water and soil conservation. However, this option might have to include adjustments of national authorities and ministerial obligations. It can only be considered when political system is reformed fundamentally. The second option is to revise or adjust the current provisions related to marine environment management in *Environmental Protection Law* and *Marine Environmental Protection Law*. However, this will take time, because legislation and law amendments will have to go through a relatively long procedure as determined by the National People's Congress (NPC). **The third option is to revise or adjust the current “Three Provisions” of the State Council, which is considered the easiest one to be implemented.**

Table 3. Provisions in Statutory Laws in comparison with Responsibilities in “Three Provisions” of the State Council

Supervision and Management Function	Basis in Statutory Laws		Functional Division in “Three Provisions”	
	<i>Environmental Protection Law</i> and other laws	<i>Marine Environmental Protection Law</i>	MEP	SOA
1. Control of total amount of pollution discharged into key sea area		Clause 3		Yes
2. Marine functional division	Clause 12	Clause 7		Yes
3. Nationwide marine environmental protection plan	Clause 12	Clause 7		Yes
4. Regional marine environmental protection plan in key sea area	Clause 12	Clause 7	Yes (jointly with other organization concerned)	Yes
5. Inter-department coordination for serious marine environment incident		Item 2 in Clause 8	Yes	
6. Pollutant discharge standard into ocean and mechanism of total pollution control	Clause 10	Clause 9		Yes
7. Environment monitoring standard	Clause 11	Clause 14		Yes
8. Pollution discharge fee	Clause 12 in Management Regulation on Pollution Discharge and Management	Clause 11		Yes
9. Offshore joint law enforcement		Clause 19		Yes
10. Approval of report of environmental impact assessment on marine engineering project	Environmental Impact Assessment Law	Clause 47	Yes (Accreditation)	Yes (approved)
11. Supervision of environmental impact assessment on marine engineering	Environmental Impact Assessment Law	Clause 47	Yes	

3.1.2 The emergency management mechanism to deal with accidents is ineffective and inefficient.

Although the oil spill in from the Penglai 19-3 oil field was identified as a serious environment incident, Level 3 of emergency response was applied by SOA. MEP did not trigger a Level 1 response to this serious environment incident, either. The main reason is that ***China has not set up a national special emergency response plan and emergency management institution for serious marine environment incidents. The National Environment Emergency Response Plan*** only outlines the mechanism for responding to environment accidents, but does not include the basic principles and specific measures for emergency response for offshore pollution (such as an offshore oil spill). **In addition, there is no specific inter-ministry and inter-provincial coordination and management authority to deal with such environmental emergencies.**

The *National Environment Emergency Response Plan* identifies the inter-ministerial joint-meeting of MEP as the comprehensive coordinating institution

in charge of the response to a national environment accidents. However, this plan has not yet been developed. Furthermore, the “*Three Provisions*” of the State Council has not defined the organizer of the inter-ministerial joint-meeting, who the members are, and the corresponding administrative body in the State Council. At present, **ministerial emergency response plans** for marine environmental accidents mainly includes the *Emergency Plan for Oil Spill in Offshore Oil Exploration and Exploitation* issued by SOA and the *Emergency Plan for Disaster in Offshore Oil and Gas Operation* issued by SAWS. However, it is difficult to handle inter-departmental and cross-regional cooperation and coordination in cases of serious marine environment emergencies based on those plans. Therefore, the corresponding response is likely to be late and lack overall coordination and technical and scientific rigour.

3.1.3 The marine environment management system is incomplete, and law enforcement is ineffective.

MEP is unable to implement its statutory “unified supervision and management” role and the punishment for the responsible party for the marine environment accident is insufficient. The information sharing mechanism among ministries does not function. The information disclosure system is not effective⁴⁷. There is no unified supervision and law enforcement team in offshore areas⁴³. The preparation, approval, revision, implementation and supervision of offshore economic development plans are not effective. Related laws need to be progressively revised and updated. Offshore rescue mechanisms and loss compensation mechanisms need to be improved.

3.2 Until now the main emphasis has been on short-term economic exploitation of offshore resources while less attention has been given to marine environmental protection

3.2.1 China places emphasis on marine economy development and not on effective regulation of the environmental performance of the offshore industry

The environmental performance of the offshore industry has not been effectively supervised by the central government and relevant authorities. There is a lack of strict enforcement of environmental protection standards in offshore oil and gas production activities. Too little attention has been given to marine environmental impacts during the change or revision of development and production plans. There has been a relative lack of investments in marine environmental protection, inadequate emergency response planning and emergency disposal capacity, and the adoption of preferential policies with low environmental protection standards in order to attract foreign

investments. Overall, marine pollution is mainly caused by land-based pollution sources. However, sea-based pollution is becoming more important, accompanying the increase in marine economic activities. In particular, most marine environment emergencies can be attributed to either production accidents or negligence of environmental management on the part of enterprises.

Although the *Environmental Protection Law* stipulates that all enterprises are obliged to protect the environment, and that whoever pollutes the environment shall take the responsibility of remediation, some enterprises seek to maximize profits at minimum cost by sacrificing environment and resource use efficiency, and by not voluntarily fulfilling their commitments on environmental protection. As long as the supervision and enforcement of laws and regulations are insufficient, some enterprises will continue to try to escape from their environmental protection responsibilities. This will result in new environment problems that will jeopardize future generations' possibilities to utilize the full potential of China's ocean areas.

The main reasons why corporate environmental responsibility cannot be implemented seriously at the present time are as follows: lack of environmental ethics and voluntary awareness of social responsibilities; unclear environmental liability, complicated relationships between causes and results of environment pollution—where results may not occur immediately and could be attributed to many sources; lack of governmental environment protection responsibility, supervision and enforcement; and lack of strict governmental requirements for large enterprise's environment protection responsibility. With high demand for capital, technology, equipment, material and personnel, marine industries are monopolized by large enterprises, such as large state-owned enterprises and joint-venture companies. These enterprises have strong connections and public relations capabilities. Some state-owned enterprises have a superior administrative level by comparison to the marine environment management authority. Once environmental issues appear, relevant governmental departments may be unable to punish adequately these large enterprises for the damage they have done.

The 2011 Bohai oil spill incident clearly showed that the government did not exert its full role as a regulator. The responsible governmental agencies should have demanded at a much earlier stage that the enterprises involved should perform based on high environmental protection standards. How to solve the problems of an enterprise's environmental protection performance? On one hand, the government needs to improve the system for the prevention of pollution and of other public

nuisances from the marine industry by clarifying the pollution prevention and accident response responsibility of the enterprise. On the other hand, the enterprise should be much more active in both internal and external awareness building and education in order to meet their environmental protection responsibilities, exert much better internal supervision, and strengthen the internal control carried out by the managers and personnel of the companies.

3.2.2 China pays inadequate attention to marine environmental protection planning and management practices, and the supporting capacity of science and technology is insufficient

Marine environmental management mainly includes management of marine environmental planning, marine environmental quality and marine environmental technology. The marine environmental planning focuses on resolving the policies and planning issues associated with the coastal areas, including: development and construction, population expansion, various pollution controls, water quality control and emergency response reserves. Marine environmental quality management focuses on the formulation of marine environmental standards, marine environmental monitoring, and marine ecosystem restoration. Marine environmental technology management focuses on handling of pollution prevention technology, forecasting and early-warning technology, developing information platform technology, emergency disposal technology and other technologies associated with the planning and quality management.

Currently, the national marine environment monitoring capacity and technology system need to be enhanced. The marine environmental early-warning system is incomplete. The marine environmental emergency information system and the information command platforms urgently need to be established. The formation process of disaster chains caused by marine emergency and emergency technology system need further research. The theory and method for evaluating the marine environmental loss need to be further studied.

In general, the investment in science and technology supporting capacity is insufficient. Although, from the 9th FYP to the 12th FYP, the national investments in scientific research in the marine environmental field has been rising. But, in comparison with fields like marine energy, marine exploration and marine resource utilization, neither the amount of funds nor the number of projects are enough. The investments in scientific research on marine environment from relevant departments of the government are mainly provided to the quality control field, such as surveys,

and exploration and monitoring of marine environments. Fewer investments are directed to research into the fields of planning management and technology management. This has led to the problem that many actual demands cannot be matched by existing capacity. For example, in the clean up of the spill in Bohai Bay in 2011, the oil dispersant used might result in additional damages to the marine ecosystem over the longer term. With sufficient technology preparedness, this issue might have been avoided. Therefore, it is necessary to sort and classify relevant issues, and resolve them by systematic scientific research.

4. POLICY RECOMMENDATIONS

The analysis of the recent oil spills in China and the experiences from oil spills abroad makes it possible to draw a number of conclusions. These are:

- *The government must develop proactive regulations and effective supervision of high-risk activities such as offshore oil and gas exploration and production.*
- *At the government level there must be an integrated inter-agency coordination mechanism and a national emergency response plan that is kept updated in order to respond immediately and effectively in the case of an oil spill.*
- *The responsibility of the operator of offshore oil and gas exploration and production to protect the environment must be clearly spelled out in the regulations applicable to such activities.*
- *The operator of offshore oil and gas activities must be able to provide or guarantee the immediate activation of the oil spill response plan with deployment of equipment and personnel to respond in the case of an accident.*
- *In order to enhance the emergency response capacity, regional and local cooperation and resources sharing are necessary for effective emergency response.*

4.1 Speed up the formulation of an integrated national marine development and environmental protection strategy and plan

NDRC should take a leading role, with the participation of MEP, MLR, SOA, MOT (Maritime Safety Administration), MOA (Fishery Administration) and coastal provincial governments, to develop a national master plan for marine development and environmental protection. This plan should be based on national development strategies, existing land and marine zoning plans, and the development plans of coastal governments. The plan should cover all coastal and marine areas of China including the Exclusive Economic Zone and islands. The plan will identify fundamental policies and strategies for balancing economic development and the need for marine environment protection. Such a plan will need to provide

requirements for the management of the marine and coastal environment and should provide a positive interaction mechanism between marine economic development and environmental protection while at the same time balancing the interests among various industries, stakeholders and coastal regions.

4.1.1 Further integrate marine development-related strategic plans for coastal and offshore areas in the various provinces.

In order to establish a sustainable marine economy in combination with effective marine environmental protection in the Yellow Sea, Bohai Sea, East China Sea and South China Sea, planning for the development of offshore areas should be integrated with plans for near-shore waters areas and coastal plans for coastal provinces.

4.1.2 Develop a national master plan for the development and layout of the main marine industrial sectors

The Master Plan (*National Coastal and Marine Spatial Plan of China*) should be drawn up based on existing sectoral plans for different maritime industries and the development plans for the different regions and local governments. The Master Plan should take into account the need for environmental protection and the importance of securing the full protection of sufficiently large key habitats and ecosystems to enable true long-term sustainable use of the resources such as fisheries and aquaculture. The plan must include renewable resource activities such as fisheries and aquaculture, tourism, offshore oil and gas, coastal nuclear power, ports, wharfs, ports and shipping lanes, coastal real estate, heavy industries such as chemical and petrochemical plants, and metal smelters. The master plan should incorporate any sub-sector plans into the overall coastal and marine spatial plans taking into account individual sub-sector needs for adequate environmental and ecosystem protection and enhancement of ecological services. NDRC needs to be responsible for the coordination, implementation, and maintenance of such a plan, including linkages to Five-Year Plans.

The planners should promote the maintenance and the strengthening of the national maritime rights and interests, through orderly investments in marine development and protection and the management of marine industries. In order to enhance the quality of the marine ecosystems, issues related to environmental protection should be given priority in international negotiations related to the development of marine resources, including for disputed sea areas.

4.2 Establish a national marine emergency response plan for environmental incidents including the system for managing such a plan

A National Emergency Marine Response Plan for Major Environmental Incidents should be established. Such a plan should be based on existing, relatively uncoordinated laws including:

The *National Environmental Protection Law*, the *Marine Environmental Protection Law*, the *Safe Production Law*, the *Overall Emergency Response Plan for National Public Incidents* and the *Emergency Response Plan for National Sudden Environmental Incidents*, and through consolidation of the existing *Emergency Response Plan for Oil Spill in Offshore Oil Exploration and Development* and the *Emergency Response Plan for Accidents and Disasters in Offshore Oil and Natural Gas Activities*, as well as the relevant regulations in the different coastal provinces.

The plan system should be made up of a *National Contingency Plan (NCP)* that applies to the entire country and different *Area Contingency Plans (ACP)* that applies to coastal provinces, large areas of the coast or bays, etc.

Led by MEP, together with administrative units such as SOA, SAWS, the Maritime Safety Administration of MOT and the Fishery Administration of MOA, a NCP (*National Marine Emergency Response Plan for Major Environmental Incidents*) should be jointly compiled, and then used as the *Special National Contingency Plan*. Existing plans from relevant departments should comply with this plan or be integrated with this plan. The Master Plan should provide the regulatory framework and guidelines for handling major marine environmental accidents, which affect more than one sector, region or country. The marine departments and coastal provinces/districts need to take their responsibilities in compiling emergency response plans for marine environmental events, respectively. Those plans shall be the *emergency response plans of departments under the State Council* and the *local or regional emergency response plans*, which may equal the *ACP* to some degree.

4.2.1 The Master Plan should include special emergency response plans and on-site emergency handling plans

The system should formulate special emergency response plans and on-site

emergency handling plans for various tiers and types of potential marine environmental accidents. The responsibilities of relevant departments and companies for various types and at different stages of accidents (before, at the beginning of, during, and after accidents) should be defined. The tiers of response refer to the severity of marine environmental accident, and might include four levels: extraordinarily severe, severe, relatively severe and moderate. These types refer to risk sources posing significant environmental threats including oil spills, leakage of dangerous chemicals and radioactive contamination, or the risk of such events.

4.2.2 The Master Plan should define specific institutional responsibilities of organizations

The Master Plan should identify the responsibilities of the leading agency, the coordinating/commanding authority, and the roles and responsibilities of supporting agencies. It should be made operational through the “Three Provisions” of the State Council and be part of the integrated national, local and sectoral emergency response network through coordination between the State Council (lead agency), the Emergency Management Office of the State Council (administrative body), relevant departments of ministries (operating bodies) and relevant departments of provinces and cities (regional bodies). The establishment of a proper emergency response equipment reserve and the conducting of regular drill exercises will improve overall national emergency response capacity.

4.2.3 The Master Plan should pay special attention to the efficiency of emergency response and effectiveness of emergency handling

China’s marine environmental management must be both effective and efficient, and its response and preparedness must be built into every step of the operations of potentially harmful activities such as oil and gas operations offshore. Disaster chain characteristics of major environmental accidents should be taken into consideration during the construction of the system. Marine environmental accidents can be caused by natural disasters such as typhoons, or accidents in offshore exploration and production units, or a combination of events. Although an oil spill may originate in offshore areas, it can affect coastal zones and result in severe damage for example to aquaculture and tourism. Such coastal impacts make it necessary to involve both sectoral agencies and provincial authorities. The system also must consider clean up in coastal areas and along shorelines. Therefore, the system must be both inclusive,

covering the activities of all potentially important sectors, and considered operational and effective by all concerned parties.

4.3 Harmonize marine-related national environmental laws and marine environmental administrative functions

4.3.1 Modify the State Council's government organization and responsibility regulations

Provisions such as “establish and enhance the enforcement and supervisory system for marine environmental protection” should be added to the “*Three Provisions*” in order to harmonize the responsibilities of relevant departments with the *Environmental Protection Law* and *Marine Environmental Protection Law*. Since marine environment protection is the overriding goal for all marine environmental management authorities, the provisions should clearly specify the function of the “unified supervision and management of marine environment protection”. The recommendations on specific function adjustments are noted in Table 4.

4.3.2 Set up a new Department of Environmental Emergency and Environmental Protection Coordination within MEP

A new Department of Environmental Emergency and Environmental Protection Coordination within MEP should be set up. The new department should be assigned the responsibility of managing national environmental emergency accidents, and the coordination of MEP with other governmental agencies. As the national emergency management department for environmental accidents, it can carry out its coordination and command functions in the case of serious marine environment accidents. It can also act as the operating office for the Inter-Ministerial Meeting of National Environmental Protection of MEP and of the Provincial and Inter-Ministerial Meeting of Bohai Environmental Protection of NDRC, and carry out its coordination function and administration of the marine environment. Three offices might be considered under the new department:

- "Emergency Management Office", responsible for the emergency management of severe and extraordinarily severe environment accidents;
- “Environmental Coordination Office”, responsible for the daily tasks of the “Inter-Ministerial Meeting of National Environmental Protection” and “Provincial and Inter-Ministerial Meeting of Bohai Environmental Protection”, and for coordinating MEP, the other ministries of the State Council and provinces in the environmental protection;

- “Program Planning Office”, responsible for compiling the annual environmental protection emergency programs and program coordination, and the corresponding budgets.

Table 4. Recommendations on function adjustments of key institutions

Basic system of unified supervision and management	Legal Basis		Recommendations on Division of Functions	
	<i>Environmental Protection Law</i> or other environmental protection laws	<i>Marine Environmental Protection Law</i>	MEP	SOA
1. total quantity control for pollutants discharged to important sea areas		Clause 3	Development of plans and allocation of total quantity	Implementation, supervision and monitoring
2. Marine functional zoning plan	Clause 12	Clause 7	Developed together with Environmental Functional Zoning Plan and Main Functional Zoning Plan	Implementation, supervision and monitoring
3. National Marine Environmental Protection Plan	Clause 12	Clause 7	Compiling jointly	Participant compiling in
4. Regional marine environmental protection plan for important sea areas	Clause 12	Clause 7	Compiling jointly	Participant compiling in
5. Inter-departmental coordination for serious marine environmental accidents		Item 2 in Clause 8	Key responsibility	
6. Proposing the sewage discharge standard and the total quantity control system	Clause 10	Clause 9	Organize the proposal development	Implementation, supervision and monitoring
7. Proposing the environmental monitoring specification	Clause 11	Clause 15	Organize the proposal development	Implementation, supervision and monitoring
8. Pollution fee	Clause 12 in the <i>Regulations on the Administration of Collection and Use of Pollution Fees</i>	Clause 11	System establishment	Implementation, supervision and monitoring
9. Approval of EIAs for marine projects	<i>Environmental Impact Assessment Law</i>	Clause 47: recommend revision of the legal provisions	Change “for record” to “for approval”, in order to be consistent with <i>Environmental Protection Law</i> and <i>Environmental Impact Assessment Law</i>	Approval
10. Supervision on EIAs for marine projects	<i>Environmental Impact Assessment Law</i>	Clause 47	Marine environmental supervision	Supervision and monitoring
11. Joint law enforcement on ocean matters		Clause 19	Marine environmental supervision	Marine environmental supervision

4.3.3 Establish an effective inter-departmental coordination mechanism for marine environmental management by enhancing the responsibilities of relevant departments with duties related to marine environment protection following the principle of prevention

Drawing on experiences from Norway and USA, it is necessary to emphasize the roles and responsibilities of the energy authority, the safety regulatory agency, the maritime administrative agency and the environmental protection agency in the

prevention of oil spills and the immediate emergency response. The Maritime Safety Administration of MOT has extensive experiences in managing marine oil spills from shipping and has cooperated with many oil spill clean-up companies over a long period. It is thus rational that the Central Staffing Office in China has assigned a coordinating role to MOT in cases of serious marine oil spill accidents. The SOA specializes in monitoring, water quality analysis, supervision and ecological damage assessments. It is recommended that SOA continue to exert this important role in marine oil spills emergency responses in the future. Simultaneously, it needs to strengthen the capacity in oil spill emergency response support system. Under the centralized leadership of the Emergency Office of the State Council, the new department proposed will be responsible for coordinating the response work for the severe, and extraordinarily severe categories of marine environmental accidents. This office should ensure that all relevant agencies carry out their individual duties in handling environmental accidents in their professional fields, and ensure various supporting agencies to adequately support this work according to their respective duties.

4.4 Improve legislation for marine environmental management

4.4.1 Improve the institutional and regulatory system for the approval and supervision of overall off-shore oil field development planning

The improved system should consider the rules and regulations for environmental assessment as articulated in the *Environmental Impact Assessment Law and Regulation on Environmental Impact Assessment of Planning*. The overall oil fields development plan for offshore oil fields, which is a special sector plan, must follow strict environmental protection review procedures. The environmental authority's responsibilities and review procedures of the plans for oil field development must be followed. The Energy Administrative Authority and Environmental Protection Authority should jointly formulate sector rules and regulations associated with planning, approval, revision, implementation and supervision of the overall development program for oil fields.

4.4.2 Strengthen the implementation of pollution prevention control and safe production regulation in oil development

The safety regulations of offshore oil production to prevent environmental damage by accidents should be strictly enforced. The key role and full responsibility of the operator for all damages must always be emphasized. Technical requirements

and specifications of equipment and measures related to oil exploration and production should be incorporated into legal provisions. For example, the National Energy Administration should formulate technical requirements of equipment and facilities for safe oil production. Well-organized inspections of industrial enterprises should be routinely arranged to check that environmental safety procedures are followed, and that the facilities to be used in an emergency are in order and ready to be used. The regulations should also explicitly stipulate that they have the obligation to identify problems, eliminate hidden troubles and disclose violations, and that penalties can be imposed immediately when problems related to environmental risks have been identified.

4.4.3 Improve the information disclosure procedures

As an initial priority, a unified mechanism of receiving and publishing the information should be established. Legislation such as the *Marine Environmental Protection Law* should provide clear and specific provisions on information collection and publishing, in accordance with the unified information publishing mechanism provisions stipulated in the *Law of Dealing with Emergence Incidents*. As the second priority, the enforcement of *Regulations on Open Government Information* should be strengthened to ensure the public's right to know. Furthermore supporting regulations on procedures for complaints and litigation to make the information disclosure regulations operational should be formulated. An approved information disclosure system will enable accident victims to receive information on time and to get ready for emergency preparation and for making pollution damage claims. In addition, the improvement of the information disclosure system is beneficial for the establishment of public participation mechanisms and for the enhancement of the implementation and compliance of environmental laws.

4.4.4 Improve the ecological damage assessment and compensation system

Specific regulations and provisions for ecological damage assessment and compensation need to be formulated, e.g., in the *Ordinance on Claim for Compensation of Marine Ecological Damage*. The regulations and provisions shall provide specific rules for case identification, compensation scope, liability exemption conditions, claiming subject of ecological damages and rights and liabilities, claim procedures and remedy methods. The existing *Technical Guidelines on Marine Ecological Damage Assessment* shall be improved and their applicability in legal practices strengthened. That means clarification of the criteria for ecological damages and for the obligations of the operator of oil and gas facilities to, as a

routine, carry out monitoring of key environmental parameters of relevance to the legal provisions.

Furthermore an Ecological Compensation Fund funded from the economic transactions of the offshore oil developers should be established. It is important that the money accumulated in such a Fund be used strictly to compensate for damages that cannot be traced to any individual operator's failure to meet the regulations. An Ecological Damage Compensation Fund was developed in connection with the Bohai Sea Oil Spill accident. This Fund should be made functional and any economic transactions from such ecological compensation funds should be made available to the public to promote transparency of operation.

4.4.5. Establish and improve the mechanisms to recover the cost for maintaining emergency response

On the one hand, the damage compensation system should clearly and explicitly identify that the party responsible for the accident should bear the full cost of emergency response. The environmental damage compensation system needs to be articulated in laws such as the *Environmental Protection Law* and *Tort Liability Law*, or through the special *Oil Pollution Damage Compensation Law*. The regulations should clearly indicate the cost-bearing responsibility of the operator. In addition, the emergency response obligations and cost-bearing responsibilities of the operator need to be strengthened by the means of compulsory insurance, corporate environmental reserve fund and industrial funds. The insurance or other financial mechanisms provided by the operator shall fully cover all potential damages that the operation may cause. Large corporations may be able to self-insure the cost of any damage.

On the other hand, the emergency response equipment and management industry shall be encouraged to establish a market mechanism for the operation of an emergency response service to be provided to the industry. Based on existing international experience it is clear that the private sector can be an important component of the national emergency response capacity. Therefore, it is necessary to establish a sound market environment (including improving the pollution damage compensation system and establishing the emergency service system) to make emergency pollution cleanup a market activity. Specific measures include the strengthening of the qualification and capacity of emergency response service entities, ensuring that compulsory pollution cleanup agreements are signed by enterprises, and that the financial guarantee system for emergency pollution cleanup

expenses is in place. The clean-up organizations will need responders' immunity from liability as they are responsible for doing the cleanup and not for the accident.

4.5 Strengthen law enforcement of marine environmental management

Through legislation and State Council authorization, strengthen the enforcement and supervision capacity in the marine environmental protection of the national oceanic administrative authority and establish a system for the administrative supervision in the marine environmental protection and law enforcement of the national environmental protection administrative authority.

4.5.1 Establish a unified offshore law enforcement team

In order to strengthen the supervision and enforcement capacity of the marine environment administrative authority, an offshore law enforcement team should be established. Such a team will ensure that law enforcement is the key supervision function of the marine environment administrative authority.

4.5.2 Establish China's marine environment administrative supervision and law enforcement system

In order to enable better supervision and guidance to other marine environment administrative agencies, the national environmental protection administrative authority should be strengthened. That will enable the identification of cross-regional and inter-departmental marine environment issues that need to be coordinated through daily administrative supervision.

4.5.3 Strengthen the supervision of the environment impact assessment system for marine energy development activities

China's marine environment administrative authority and the supervision agency should enhance their supervision and inspection capabilities by carrying out assessments of environmental impacts and damage evaluations. Provisions for such evaluations, their frequency and report contents should be specified in the legislation. The exercise of responsibilities by the relevant authorities in charge of environmental impact follow-up and post-evaluation, as well as of violations needs to be well supervised.

4.6 Enhance corporate environmental responsibility and improve environmental risk prevention capacity

4.6.1 Express the responsibility of operators for developing and complying with the emergency response plan and revising the emergency response plan as necessary

Oil and gas companies exploring and operating in offshore areas must be required to have adequate emergency response plans. Relevant laws should be revised drawing on experiences from Norway and the USA to clearly specify that the operator (the oil/gas companies) shall have the full responsibility to meet any need for immediate emergency response. The governmental authority role is to check that the companies fulfil all such obligations. By law in Norway and the USA, the operator, before entering into any activity that may cause harm to the environment, has to either guarantee that the company/operator itself is able to provide full emergency response capability or, as an alternative, has signed an agreement with a capable emergency response company/organization as a prerequisite condition for approval of oil development activities.

4.6.2 Develop a complete set of applicable specifications of appropriate disaster response, exploration/production and engagement permission for the operators

It is recommended that the national environment administrative authority (MEP) should take the lead and work with industry associations and leading enterprises to prepare the specifications by consulting the relevant international standard of the same industries, such as offshore oil/gas.

4.6.3 Strengthen corporate environmental awareness and responsibilities

The information departments of various marine administrative authorities should contribute to the building of environmental awareness among the public and inform the private sector of their responsibilities in protecting the environment. Corporate environmental protection capacity will be considered an essential condition for approval of the enterprises' involvement in any activity related to marine development and resource exploitation. Local maritime courts and procuratorates should clearly address enterprises' legal responsibilities for pollution and damages of marine environment due to their operation. Such actions will discourage operators from risking environmental damage in order to save costs. The authorities for the industrial sector shall require the preparation of response plans, insurance and compensation guarantee systems to spread the risks for enterprises through industrial sector associations, enterprise alliances and insurance companies.

4.6.4. Enhance the prevention of environmental risk from marine-related enterprises

Legislation departments in the National People's Congress (NPC), NDRC and MEP must consider the environmental responsibility of foreign and national companies in cooperative offshore development projects. Relevant laws and regulations should clearly define the responsibility of the government and the operators respectively in cooperation and joint development projects, in order to mitigate or decrease the risks of marine accidents leading to environmental damage.

4.7 Strengthen capacity building of science and technology in marine environmental management

4.7.1 Strengthen research, technology development and monitoring related to marine environmental management

Environmental or marine public projects or special national science and technology development programs, should emphasize the need for theoretical and technological research. Research and development is particularly needed in areas such as the overall strategic spatial planning of ocean and coastal, coastal and marine emergency response, marine environmental management laws and regulations, marine environmental monitoring and early-warning systems, methods for networking and information dissemination, marine pollution control technologies and standards, marine ecological loss evaluation and remediation methods, and marine disasters risk assessment and prevention tools. One very important way of stimulating research and development is through stimulating international cooperation.

4.7.2 Strengthen special studies on oil spill emergency management technologies

Priority areas for research are environment impact assessment methods for offshore oil and gas development projects and procedures for ecological risk assessments caused by disasters, guidelines for oil spill damage evaluation and compensation, oil spill emergency monitoring and pollution control and clean-up technology, as well as research on the environmental state and capacity of the Bohai Sea and other Chinese seas. Other priority research areas include decision-making support systems for emission reduction, oil spill source tracing technologies, oil spill risk monitoring and assessment technology, national oil spill emergency response systems, risk identification for offshore oil spills, risk prevention and comprehensive management technologies, research related to marine industrial policies and restructuring, national energy policies and structure adjustment. Oil and gas

developers should be obliged to invest in such research and to establish regional marine environmental research funds.

Regional Air Quality Integrated Control System Research

EXECUTIVE SUMMARY

1. CHINA IS FACING SEVERE REGIONAL ATMOSPHERIC POLLUTION

China is facing severe air pollution. Though the traditional coal-burning pollution problems have not been solved, a more complex regional air pollution challenge characterized by O₃ (ozone) and PM_{2.5} (Particular Matter having an aerodynamic diameter less than 2.5 μm and thus can suspend in the atmosphere for a long time) has emerged. According to the WHO's evaluation of the PM_{2.5} annual average concentration from over 1082 cities around the world, China's best rank is 808 for Haikou and the worst city only ranks 1058, almost at the bottom of the list. PM_{2.5} will become the most important pollutant that influences China's air quality, based on the *Environmental Air Quality Standard* (GB3095-2012) that was revised this year and is about to go into effect.

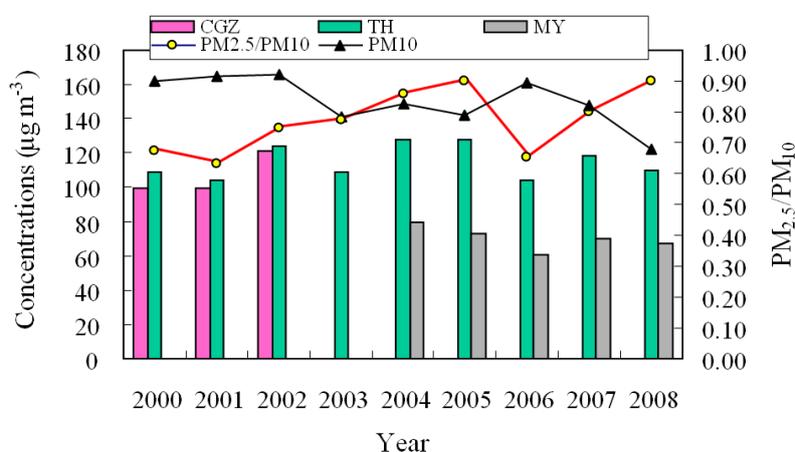
1.1. High concentration and heavy pollution of PM_{2.5}

There are three basic characteristics of PM pollution in China. **(1) High PM_{2.5} concentrations.** High PM_{2.5} concentrations are frequently found in Chinese cities. For example, the annual average concentration of PM_{2.5} is as high as 60-90 μg/m³ in Eastern China, whereas PM_{2.5} could exceed 100 μg/m³ in industrial areas. These concentrations are significantly higher than the standard recommended by international organizations and other countries (below 10 μg/m³). **(2) High contribution of PM_{2.5} to PM₁₀.** Results from long-term measurements conducted in Beijing suggested that the ratio of PM_{2.5} to PM₁₀ tended to increase during the last decade, indicating that the contribution of PM_{2.5} to PM₁₀ became more important. **(3) Apparent spatial distributions.** PM_{2.5} concentrations varied considerably in different regions. Generally, PM_{2.5} is higher in the northern region compared to the southern region, and is higher in the western region than the eastern region. Moreover, PM_{2.5} is usually higher in winter than the other seasons. Figure 1 presents the annual average PM_{2.5}/PM₁₀ concentrations of Beijing, the capital city of China.

1.2. Complex PM_{2.5} sources with high percentage of secondary PM

The mass concentration and chemical speciation of PM_{2.5} is highly dependent on the measurement region. Generally, POM (particulate organic matter, organic species in particles) and SNA (the sum of sulfate, nitrate and ammonium) are the major components in PM_{2.5}, and are significantly influenced by emissions (which usually show spatial and temporal variations) and atmospheric oxidation activity (which control the conversion from the gaseous pollutants to atmospheric particulates). In the eastern region (including urban, rural and forest areas), SNA is the dominant component in PM_{2.5}, accounting for 40%~57%; the contribution of POM was 15%~53%, which is lowest at the Changbai Mountain and highest in Urumchi. The sum of POM and SNA constitutes 53% of PM_{2.5} in Beijing, the rest being crustal dust and other un-identified or un-analyzed components.

Figure 1. Annual variations of the PM_{2.5}, PM₁₀ and the ratio of PM_{2.5}/PM₁₀ during 2000 to 2008 in Beijing*

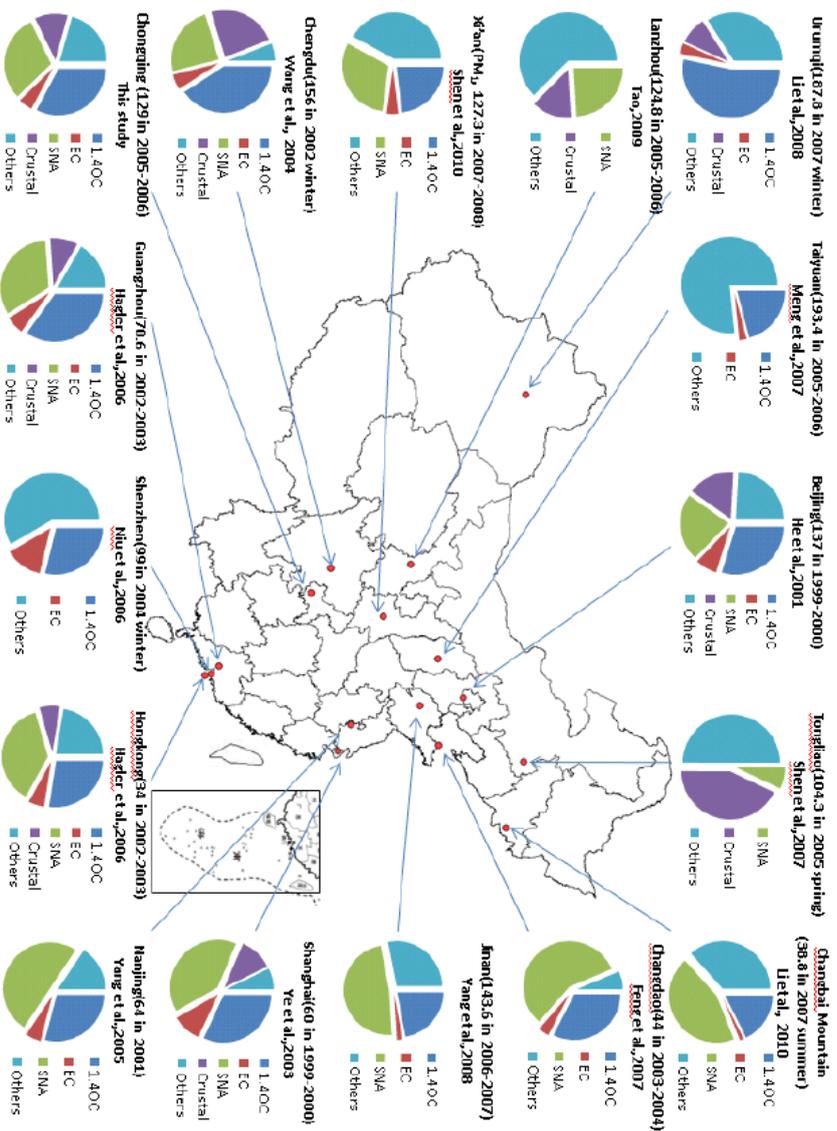


* Sampling was conducted in three sites in Beijing, i.e. ChengGongZhuang(CGZ, an urban-center site), Tsinghua University Campus (TH) and Miyun (MY, a regional background site)

Source: Atmospheric Particular Matter and Regional Complex Air Pollution, He Kebin et. al., Science Press, 2011

When significantly impacted by dust, the contribution of minerals to PM_{2.5} could be considerable. It should be pointed out that in addition to the regions near the source areas of dust (e.g., northern China, which holds a large area of desert, is more inclined to be affected), dust could also be transported to central and southwestern China. Thus, PM_{2.5} in China is also characterized by high contribution of mineral dust relative to the developed countries

Figure 2. Chemical composition of PM_{2.5} across China

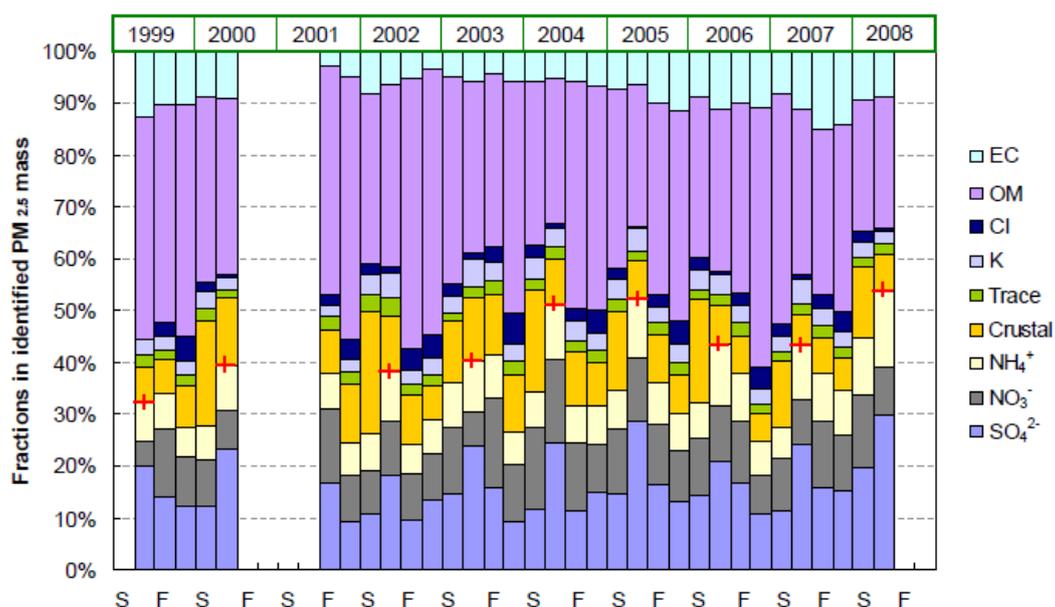


OC—Organic Carbon. EC—Elemental Carbon. SNA—sulfate, nitrate and ammonia ions. Crustal—Crustal dusts
 Source: Atmospheric Particular Matter and Regional Complex Air Pollution, He Kebin et al., Science Press, 2011

Moreover, total carbon (TC) and SNA in PM_{2.5} were found to be comparable in Chinese cities such as Beijing, Chongqing, Guangzhou, and Shanghai, whereas SNA was 26% higher than TC in Los Angeles, indicating that the secondary species represent a major source of PM_{2.5} in the mega-cities of the developed countries. The contribution of EC (Elemental Carbon, the aggregate of compounds composed with nearly pure carbon) to PM_{2.5} is much higher in Shanghai and Shenzhen compared with other Chinese cities, but much lower than that of Los Angeles and Brisbane. There are large seaports in all of the cities, indicating that emissions from shipping might be an important source of EC.

The transportation and evolution of PM are influenced by the meteorological parameters, thus, the composition of PM_{2.5} is expected to exhibit seasonal variations. The contribution of inorganic species among the distinguishable matters in PM_{2.5} tends to be highest in summer, based on the PM_{2.5} samples of Beijing. But **the percentage of secondary species continued to grow in PM_{2.5} from 1999 to 2008.** On a yearly basis, the SNA fraction in identified PM_{2.5} mass rose from 29% in 2002 to 36% in 2007 (Figure 3).

Figure 3. Seasonal PM_{2.5} speciation abundances at Tsinghua in Beijing from the summer of 1999 through the summer of 2008

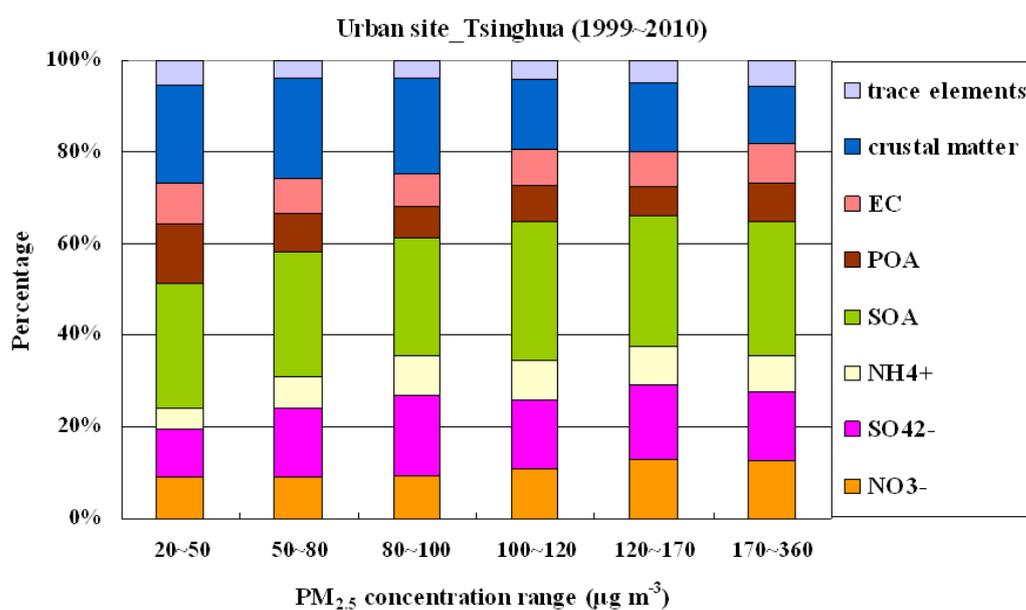


Average percentages of SNA in each summer are marked with cross symbols. S refers to Spring and F refers to Fall.

Source: Atmospheric Particulate Matter and Regional Complex Air Pollution, He Kebin et. al., Science Press, 2011

The ratio of secondary species is higher than usual during high PM_{2.5} episodes. Figure 4 presents the relationship between the PM_{2.5} speciation abundances and the PM_{2.5} mass concentration, which was based on a long-term measurement. When the PM_{2.5} concentration was below 120 µg/m³, the contribution of secondary species (including SNA and secondary organic aerosol) was found to increase with the PM_{2.5} concentration; whereas the contribution of secondary species did not increase significantly when the PM_{2.5} concentration was above 120 µg/m³. These results indicate that the secondary species are some of the important factors responsible for the high PM_{2.5} concentrations observed in Beijing.

Figure 4. The relationship between the PM_{2.5} speciation abundances and the PM_{2.5} mass concentration



Source: Atmospheric Particular Matter and Regional Complex Air Pollution, He Kebin et. al., Science Press, 2011

1.3. Regional transport

Rapid development of urbanization and regional economic development aggravate the complex air pollution in the Yangtze River Delta. Cities in the Yangtze River Delta are suffering from regional air pollution beyond local pollution while serious regional pollution is becoming more and more frequent. In winter and spring, influenced by complex factors like inland pollution, northern sand-dust and adverse local meteorological conditions, the impact of regional fog, haze and floating dust stands out. In early summer and late autumn, stalk-burning contributes atmospheric

fine particle pollution to the city and surrounding areas, which triggers large-scale regional haze pollution, resulting in a simultaneous variation trend of air quality in key cities of the Yangtze River Delta.

Table 1 shows that in 2011, there were 28 polluted days altogether in Shanghai. Taking Shanghai, Nanjing, Suzhou, Nantong, Lian Yungang, Hangzhou, Jiaxing and Ningbo as references, over half of these cities were simultaneously polluted on 22 of these days, which amounts to 78.6% of all the air pollution days; the days when all 8 cities exceeded the standard occupied 14.3% of the pollution days, and the situation when only Shanghai exceeded standard occurred on just 2 days.

Table 1. The air quality of 8 cities around Shanghai in the days when Shanghai failed to comply (Year 2011)

	All cities (8) failed to comply	Half cities (4) failed to comply	All the cities meet the air quality standards	Shanghai's API higher than the regional medium
Days	4	22	2	20
Percentage	14.3%	78.6%	7.1%	71.4%

1.4. High frequency and elevated levels of heavy pollution days

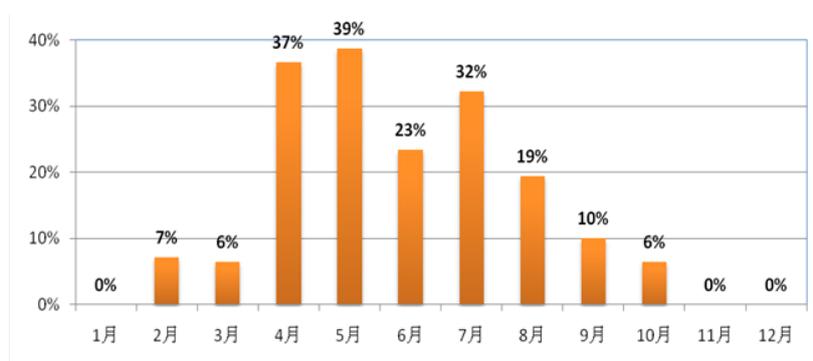
The annual average concentration of atmospheric pollutants including PM_{2.5} is high for Chinese cities. More than that, the heavy pollutant days occur with greater daily average concentrations and higher frequency. Consider Shenzhen, with relatively better air quality, for example. Since 2006, haze days happen much more frequently, the pollution index has grown and the oxidation level of the atmosphere has increased. The highest hourly concentration of PM₁₀ reached up to 428 $\mu\text{g}/\text{m}^3$, twice the national second-level standard. Some stations have days with the O₃ highest hour concentration over the limit nearly 10% of the time.

1.5. Single-factor to multi-factors: excessive pollution causes shift

With PM_{2.5} and O₃ concentrations increased, the mixed air pollutants promote the chemical and photochemical reactions in the air and result in even more complex air pollution in Eastern China. Especially in summer, the oxidation level of the atmosphere increases with higher O₃ concentration, and convert more SO₂ and NO_X into secondary particulates such as sulfate and nitrite. Consider Shanghai for example; the pollution levels remain high from April to July and reach the peak in May, as

shown in Figure 5. The oxidation level of the atmosphere in summer is enhanced which is one major reason for the high PM_{2.5} pollution.

Figure 5. Monthly distribution of the PM_{2.5} and O₃ simultaneous pollution in Shanghai, 2011



Source: Air quality monitoring data from Shanghai Environmental Monitoring Center

The main reason for China's regional air pollution is abundant emissions and concentrated distributions of many air pollutants. China's coal consumption is growing at the rate of more than 200 million metric tons per year and has accounted for more than 48% of the world total, whereas the population of motor vehicles also grew rapidly from 120 million to 190 million during the 11th Five-Year Plan. These two factors cause China's emissions of primary particulate matter, SO₂, NO_x and VOCs to be more than 20 million metric tons. The emissions are mostly concentrated in Eastern China and result in deterioration of air quality in some areas such as Beijing-Tianjin-Hebei, Yangtze River Delta, and Pearl River Delta.

The severe air pollution not only did serious harm to the public health, but also caused massive economic loss. The consequences estimated by the WHO and other organizations worldwide: millions of people die of air pollution every year; many respiratory and cardiovascular system problems result in an inability to work or study; grain production shrinks due to the high concentration of O₃; acid rain causes damage to the forest and ecological environment, and even to the quality and appearance of buildings. China is experiencing all of these problems. Last year the public alarm induced by the long-time, wide-spread haze days in Beijing very badly impacted the government's credibility.

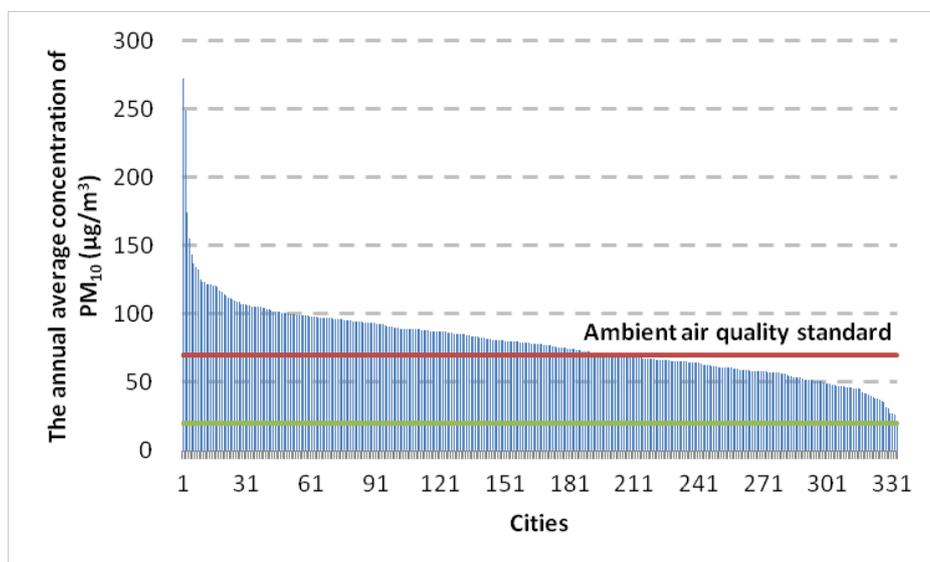
2. IMPROVING THE AIR QUALITY IN CHINA IS A LONG AND ARDUOUS TASK.

Although PM_{2.5} monitoring has not been introduced in most cities in China, the environmental monitoring data for SO₂, NO₂ and PM₁₀ indicate that the urban air quality remains much worse than the standards for a well-off and modernized society. According to the atmospheric environmental monitoring data in 333 cities at the prefecture level or above in China, the annual mean concentration of SO₂, NO₂ and PM₁₀ in prefecture-level cities was 35µg/m³, 28µg/m³ and 79µg/m³ respectively in 2010. In accordance with the *Ambient Air Quality Standards* (GB3095-2012) which was revised this year and is about to be implemented, cities where the annual average concentration of SO₂, NO₂ and PM₁₀ is higher than the standards number 18, 51 and 201 of the 333 cities respectively. Even with the PM_{2.5} and O₃ pollution not taken into consideration, as many as 216 cities cannot meet the standards, accounting for 2/3 of the total number of cities.

Based on the 2005 World Health Organization (WHO) ambient air quality guidelines, China lags far behind the WHO requirement (20µg/m³) for PM₁₀ in terms of the annual average concentration. Even Haikou, the city with the lowest concentration of PM₁₀ in China, fails to meet the requirement. And the average PM₁₀ concentration national-wide is three times higher than that of Haikou. The results from domestic and international scientific research show that the PM_{2.5} mass concentration is equivalent to about 50%-60% of PM₁₀ mass concentration. In view of this, China's PM_{2.5} mass concentration is at least three times higher than the level specified in the WHO guideline, though PM_{2.5} monitoring data is relatively inadequate in China. **Pollution of atmospheric particulate matters represented by PM₁₀ and PM_{2.5} will remain the primary atmospheric environmental problem facing China for quite a long period of time.**

As China marches on the path to a well-off and modernized society, its people, especially those in cities that are concerned about human health hazards associated with air pollution, are demanding greater attention be given to ambient air quality problems. *Ambient Air Quality Standards* (GB3095-2012), with reference to the WHO air quality standards, has introduced a stricter limit for PM₁₀ and included PM_{2.5} in the index system in the revision this year, so that the PM₁₀ and PM_{2.5} standards are in line with the WHO Phase I target for air quality improvement. To meet people's increasing requirements, the vast majority of cities in China need to achieve the ambient air quality standards in 15 to 20 years. In 2025, 80% of the cities are expected to do so. It means that the compliance rate for PM₁₀ urban mean concentration should be raised by 40 percentage points during the 12th, 13th and 14th Five-Year Plan period from the current 40% (as shown in Figure 6).

Figure 6. Annual average concentration of PM₁₀ in 333 cities of China, compared to ambient air quality standard for PM₁₀



Source: Air quality monitoring data from China National Environmental Monitoring Centre

Such targets necessitate a **reduction of over 10% in PM₁₀ average concentration in major cities in each FYP period** (as shown in Table 2). According to existing PM_{2.5} monitoring data, PM_{2.5} accounts for more than 50% of PM₁₀ in urban areas, which speaks for much more severe non-compliance with PM_{2.5} standards than PM₁₀ standards. To achieve a compliance rate of 80% for PM_{2.5} in 2025, **PM_{2.5} mean concentration in major cities needs to decrease by at least 13% in each of the coming FYP periods.**

PM_{2.5} resulted from complicated sources, including primary particulate matters directly emitted from pollution sources and secondary particles formed from SO₂, NO_x, VOCs and NH₃ in the atmosphere. For most cities in China, especially more polluted eastern cities, it is more difficult to control the PM_{2.5} pollution than the PM₁₀ pollution. In light of the nonlinear characteristic of the impact of natural sources and the formation process of secondary particulate matter, **precursor emissions must be reduced by more than 15% in each FYP period**, so that a decrease of 13% in PM_{2.5} concentration and a compliance rate of about 80% around 2025 are attainable.

Table 2. Compliance rate of urban annual average PM₁₀ concentration under different scenarios

	2010	2015	2020	2025
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PM ₁₀ concentration down by 10% every 5 years	40%	50%	63%	77%
PM _{2.5} concentration down by 13% ¹ every 5 years	27%	44%	60%	79%

Note 1: Results are obtained through the conservative estimation on the premise that PM_{2.5} accounts for 55% of PM₁₀ due to the absence of PM_{2.5} monitoring data in majority cities.

3. CURRENT CONTROL MEASURES ARE NOT EFFECTIVE ENOUGH TO ACCOMPLISH THE SET TARGET IN AIR QUALITY IMPROVEMENT

China has introduced a series of control measures over the years, giving a strong impetus to the prevention and control of atmospheric pollution. In particular, national total SO₂ emissions have declined for the first time owing to the innovative policy measures implemented since the 11th FYP period. It significantly lowers SO₂ and PM₁₀ concentrations in urban ambient air and improves urban air quality. These measures include:

Develop and implement more stringent pollutant emission standards. Air Pollutant Emission Standards are an important legal basis for managing the sources of air pollution. To control the most contributive categories of stationary sources of atmospheric pollutants, China has developed and implemented various emission standards since the 1980s and introduced more stringent standards for improving pollution control requirements (as shown in Table 3). Among them, emission standards for power plant boilers are in line with the international advanced level. Efforts were also made to drive forward the emission standards for mobile sources. National emission standards I was rolled out for light vehicles in 1999 and it has evolved into standards IV for light gasoline vehicles but weaker requirements for heavy vehicles, motorcycles and non-road mobile machinery.

Table 3. Emission standards for stationary sources of major atmospheric pollutants

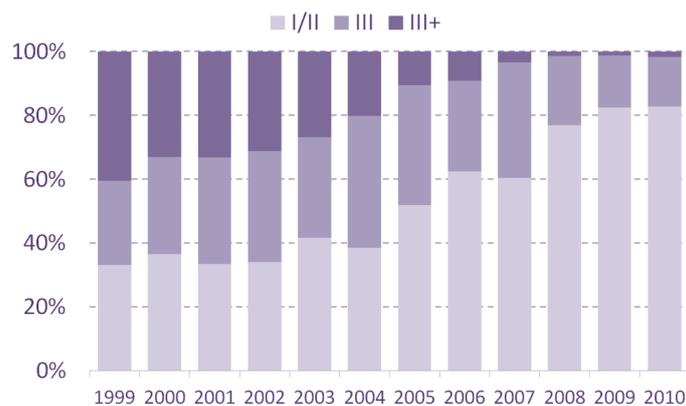
Control Object	Standard No.	Year of Implementation and Revision
Power plant boilers	GB13223	1991, 1996, 2003, 2011
Industrial boilers	GB13271	1983, 1991, 1999
Coking process	GB16171	1996, 2012
Iron and steel production process	GB28662-GB28666	2012
Cement production process	GB4915	1985, 1996, 2004

Control the total emissions of atmospheric pollutants. On the basis of the *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution*, China specifies two control zones and kicks off the control of total SO₂

emissions. A series of policy measures aimed at this binding target was implemented during the 11th FYP period, such as a preferential tariff for desulfurization, replacing small units with large ones, backward capacity elimination, and regional restrictions; remarkable achievements were accomplished in reducing emissions in the engineering, structural and management aspects. During 2005-2010, the desulfurization proportion of thermal power units has increased from 14% to 86%, and small thermal power units with a total installed capacity of 76.83 GW have been shut down. Outdated production capacity equivalent to 120 million tons of iron, to 72 million tons of steel, and to 370 million tons of cement was eliminated. SO₂ total emissions were reduced by 14.29%, which exceeds the emission reduction target in the 11th FYP period. On this basis, a reduction of 8% in SO₂ emissions remains a binding target during the 12th FYP period, and a reduction of 10% in NO_x emissions is included in emissions reduction requirements.

Comprehensively improve the urban atmospheric environment. A national policy to promote service and commerce while restricting industry has been carried out in cities. Specifically, a large number of heavily polluting enterprises were relocated from urban areas to more remote areas. In urban clean energy transformation, cogeneration and central heating were developed and a number of small coal-fired boilers were eliminated. Oil and fuel recovery was introduced in gas stations in the Beijing-Tianjin-Hebei region, Yangtze River Delta, and Pearl River Delta to reduce VOC emissions from oil and gas. Urban atmospheric environmental remediation has achieved positive results. In 2010, the annual average concentration of SO₂ and PM₁₀ in cities at the prefecture level or above were 35μg/m³ and 81μg/m³, down by 24.0% and 14.8% from the 2005 level respectively. In accordance with the then Ambient Air Quality Standards (GB3095-1996), 83% of the cities have meet the Grade II air quality standards, rising from the 52% in 2005 (as shown in Figure 7).

Figure 7. Proportion of cities up to Grade I, II, and III air quality standards and below Grade III standards in China during 1999-2010



Source: State of Environment, Ministry of Environmental Protection

Actively explore the joint prevention and control mechanism for regional atmospheric pollution. To ensure the air quality during Beijing Olympic Games, Shanghai World Expo and Guangzhou Asian Games, North China with six provinces (autonomous regions and municipalities), Yangtze River Delta with three provinces (municipalities) and Pearl River Delta, regardless of the administrative boundaries, have jointly set up the Leading Group, signed the Environmental Protection Cooperation Agreement, and rolled out the air quality assurance program for inter-provincial collaboration and inter-departmental interaction. Concerted efforts with close cooperation were made for the overall control of SO₂, NO_x, PM and VOCs emissions, harmonized environmental law enforcement and supervision, and unified environmental information disclosure. Such a strong joint force for pollution control has produced positive results, guaranteeing good urban ambient air quality in the events. Moreover, useful experience has been accumulated for further regional joint prevention and control of air pollution.

In future years, most of the above measures will continue to play an important role in the prevention and control of air pollution in China. However, this is not enough to cut down the precursor emissions by over 15% in each FYP period, let alone to achieve the target of air quality improvement. There are four types of challenges. First, the legal basis for air pollution control remains very weak, providing inadequate support of air pollution control policies and measures. Second, the capacity building for overall air pollution control lags behind in all aspects, ranging from the national level to the local level, from stationary sources to mobile sources, and from policy making to management and practice. Human input and scientific support are insufficient, hindering the formation of a complete management system and undermining the response to regional atmospheric pollution with its complex and composite features. Third, with the advance of industrialization, urbanization and

mobilization in the future, annual consumption of coal in China will keep increasing and exceed 4 billion tones, and the population of light-duty gasoline vehicles will increase by approximately 15 million every year. China faces tremendous pressure to digest new emissions and to further substantially cut down atmospheric pollutants. Fourth, the pollution control level for coal-fired plants and motor vehicles remains low. Pollution control mainly depends on the end treatment and systematic, comprehensive and efficient control measures are absent.

In accordance with the previous analysis, China needs to make improvements in regulations, management mechanism, capacity building and control measures in order to achieve the goal of air quality improvement. This study summarizes the air quality management experience in the United States and Europe, and comes up with five policy recommendations for regional air quality control based on China's practices.

4. POLICY RECOMMENDATIONS FOR REGIONAL AIR QUALITY CONTROL

4.1. Accelerate the amendment to the Law on the Prevention and Control of Atmospheric Pollution

The Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution was enacted in 1987. With the process of air pollution control, amendments were made in 1995 and 2000 respectively, on which basis a series of laws and regulations has been rolled out and implemented to promote the prevention and control of air pollution. This law has played an important role over the years in reducing emissions of air pollutants, preventing and controlling air pollution, protecting people's health, and promoting sustainable economic and social development. However, air pollution has undergone a huge change since 2000, shifting from typical coal smoke pollution to combined vehicle and coal pollution. More specifically, the major components of air pollutants changed from SO₂ and PM₁₀ to PM₁₀, PM_{2.5}, O₃ and their precursors as air pollution expands from cities to regions. Mobile sources and industrial process sources joined coal-fired sources in producing air pollution. The existing Law is hardly adapted to the new trend in the prevention and control of regional, combined and complex air pollution shaping in the process of rapid industrialization, urbanization and motorization. To this end, amendments are required in the following aspects to provide legal support for the corresponding policy measures:

First, PM_{2.5} and O₃, having an important impact on human health, should

be placed in a core position in the prevention and control of air pollution in China. Secondary PM formed in the chemical reactions of such pollutants as SO₂, NO_x, VOCs and NH₃ accounts for more than 50% of PM_{2.5} in the air. NO_x and VOCs are also the reactants of O₃. In view of this, the Law shall stress the integrated control of multi-pollutant emissions. In addition to SO₂ and smoke dust, important precursors of PM_{2.5} and O₃ formed from NO_x, VOCs and NH₃ should also be brought under strict control. In terms of sources, as industrial pollution control deepens, prominence should also be given to non-point sources such as small and medium-sized boilers, dust, food and beverage fumes and painting spraying, as well as motor vehicles and other mobile sources.

Second, incorporate air quality improvement as the core content of atmospheric environment management. Government responsibilities and obligations in air quality compliance management within the jurisdiction should be clarified, and more responsibilities and corresponding power should be given to governments at all levels in air quality management. A technical roadmap for urban air quality compliance management should be developed, specifying the compliance deadline based on the status and gap in different cities, as well as the goals and priorities in different phases of the whole process. Consequences for the government of the cities that fail to meet the ambient air quality standards should also be clarified

Third, improve the joint prevention and control mechanism for regional air pollution to address the transmission of atmospheric pollutants across administrative boundaries. Based on the experience of Europe and the United States, the control mechanism for regional total emissions should be improved to address pollutants that travel long distances and affect regional air quality, such as SO₂, NO_x and VOCs. The Ministry of Environmental Protection determines the target of total emission control and assigns it to each administrative region, reducing the impact of upwind atmospheric pollutants on downwind air quality. Joint prevention and control mechanisms for regional atmospheric pollution should be introduced to ensure that the target is achievable.

Fourth, further strengthen the penalties for violations and increase the cost of atmospheric environment illegalities. Punishment and penalties for illegal actions should be raised. Penalty standards provided in the existing Law for excessive emissions, non-compliance with ambient air quality standards and data falsification are too low. As a result, the cost for violations is far less than that for compliance, which is not conducive to the prevention and control of atmospheric pollution. Moreover, the provisions on treatment and control within specified deadlines should

be refined, and the decision-making power clearly allocated to competent administrative departments of environmental protection in governments at all levels. In addition, it is necessary to make law enforcement more cost effective, step-up law enforcement efforts, and refine the legal responsibilities of environmental regulators to ensure that those convicted receive appropriate penalties.

Fifth, put emphasis on the control of emissions from non-road mobile sources. Emissions from ships, aircrafts, trains, and non-road machineries should also be included under the Law, with clarified management responsibilities of MEP for dealing with non-road mobile sources.

4.2. Improve the air quality management mechanism, and enhance air quality management capabilities

China launched the prevention and control of air pollution in the 1970s. Since then, the emphasis has been put on the emission intensity of key pollution sources and the total emissions of major pollutants, rather than ambient air quality. Targets of atmospheric pollutant emissions reduction are primarily based on emission reduction technologies and economic potential, rather than on the requirement of human health for air quality. Air quality assessment takes into account three “traditional” atmospheric pollutants, SO₂, NO₂ and PM₁₀, instead of PM_{2.5} and O₃, both of which have a more severe impact on human health. To insure a healthy, comfortable and safe atmospheric environment where the masses live, China has to change its thinking about air pollution control—identify compliance with air quality standards as the core and the ultimate management goal, and tackle the emission reduction of PM_{2.5} and related precursors as an important means to improve air quality. Such an air quality management mode needs the support and backup from a sound management mechanism and powerful management capabilities. Compared with Europe and the United States, China is faced with more complex air pollution and a more difficult management task, but has weaker support in terms of the number of managers, institutional facilities, financial inputs and technologies. In order to meet the requirements of air quality standards and pollutant emission reduction for environmental management, it is urgent for China to enhance the mechanisms and capacity building in the following aspects:

First, allocate the appropriate resources with reference to the air management system of Europe and the United States. Atmospheric administration functions are dispersed in several business units of MEP, such as Department of Total Pollutants Control, Department of Pollution Prevention and Control, Department of

Planning and Finance, Department of Environmental Monitoring, and Department of Science, Technology and Standards. Overlapping management responsibilities among business units undermine the efficient coordination in the entire atmospheric management. Meanwhile, human resources for atmospheric administration are limited. There is, at most, one dedicated division taking the responsibilities of air management within each department, and there are only a total of four established persons in the Department of Pollution Prevention and Control directly responsible for air quality management. In contrast, the Office of Air and Radiation (OAR) led by the Assistant Director of U.S. Environmental Protection Agency (EPA) is directly responsible for atmospheric management. It is one of the 11 central bodies of the EPA and has 1,400 managerial persons and four sub-offices, namely air quality planning and standards, atmospheric program, transportation and air quality, radiation and indoor air. Like the U.S., most European countries set up a dedicated coordination organization for atmospheric management and allocate human resources for meticulous management. The U.S. management framework for atmospheric management enables uniform and efficient coordination and refined labor division and duties for specific work. It has laid the institutional and personnel base for raising atmospheric management capabilities. To improve atmospheric management capabilities for quantitative and meticulous management, China needs to comprehensively integrate associated functions and resources, and set up a dedicated atmospheric management department for overall coordination, that is similar to the management mode applied in medicine supervision, water resource and nuclear safety. It also requires substantially increased technical support and human resources to pave the way for quantitative and meticulous air quality management.

Second, improve the joint prevention and control mechanism for regional air pollution to facilitate overall regional management in severely polluted Beijing-Tianjin-Hebei, the Yangtze River Delta and Pearl River Delta. Under the Chinese jurisdiction-based environmental management system, departments of environmental protection account to government at the same level. This is not conducive to the control of regional air pollution. Meanwhile, local management and technical personnel engaged in the prevention and control of air pollution, compared with national atmospheric management, are even more inadequate. In contrast, dedicated representatives in the 10 regional offices under the US EPA cooperate with the state governments. Apart from coordinating regional atmospheric management, they also cultivate leadership talents and skilled specialists with atmospheric management expertise, thus enhancing capabilities to address the issue of regional atmospheric environment. China needs to set up specialized agencies in areas with

serious air pollution, such as the Beijing-Tianjin-Hebei region, the Yangtze River Delta and the Pearl River Delta, to take charge for the overall regional air quality management. Joint meetings should be held to facilitate the unified and coordinated regional joint prevention and control mechanism. A joint law enforcement and regulatory mechanism for regional atmospheric environment should be introduced for enhanced enforcement and supervision. Regional consultations are needed under the environmental impact assessment and consultation mechanism for major projects. In addition, mechanisms should be introduced to facilitate regional exchanges and sharing of environmental information and regional early warning and linkage in atmospheric pollution. All these measures are aimed to increase the capacity in local air quality management under “unified planning, monitoring, supervision, assessment and coordination” in regional air pollution prevention and control by setting up local departments on air quality management and vehicle emission control in some key cities.

Third, increase the funding for air quality management, and advance the implementation of the National Clean Air Action Plan included in the national budget. In the 11th FYP period, the investment in environmental protection accounted for about 1.35% of the GDP, well below the level of developed countries. Also, the inputs for the prevention and control of atmospheric pollution have been insufficient in water environmental protection, heavy metal pollution control, and ecological protection for a long time. It directly leads to inadequate investment in atmospheric management capacity building, and a serious lack of data and research to support quantitative and meticulous management. In terms of funds, the central government should set up special funds for atmospheric pollution prevention and control and increase the introduction of specialized management and technical talents to enhance research capacity and basic management capacity. Meanwhile, it should also develop an investment mechanism for diverse investment subjects and approaches, and lead and encourage local governments and enterprises to put in place financial incentives for air pollution control. In terms of technologies, a number of national special research projects should be carried out in China as soon as possible, in hope of breakthroughs for such major scientific issues as the generation mechanism of air pollution in different regions, source apportionment, and control and prevention paths.

4.3. Accelerate the transformation of economic development mode and promote the continued reduction of pollutants

The U.S. and European experience show that improvement of air quality accompanies transformation of economic development mode. In the recent three

decades, the decreasing proportion of heavy chemical industries in such industrialized regions as Europe and the U.S contributes to the gradual reduction of air pollutant emissions in the industrial process. However, now in the late stage of industrialization, China still depends heavily on energy-consuming and high-polluting industries for economic development. Although the emission intensity of air pollutants per unit of GDP is 40% to 80% lower than the 1990 level, SO₂ and NO_x emissions are still one to three times higher due to the fast growth of heavy chemical industries in the process of rapid economic expansion. In particular, China's crude steel and cement outputs have increased by four and two times respectively since 2000 (as shown in Table 4). In 2010, crude steel output in the Beijing-Tianjin-Hebei region and cement output in the Yangtze River Delta region were 1.9 times and 4.3 times as much as that of the U.S respectively. To substantially cut down emissions of atmospheric pollutants amid stable and rapid economic expansion, it necessitates a faster decline in the emission intensity per unit of GDP than that in last two decades to offset the negative effects of rapid GDP growth on pollution reduction.

Table 4. Steel and cement outputs in 2000 and 2010 (100 million tons)

	1990	2000	2010	Proportion of global output in 2010
Crude steel	0.66	1.29	6.27	44%
Cement	2.10	5.97	18.68	60%

Taking the opportunity of socio-economic transformation, it is pressing for the National Development and Reform Commission (NDRC), Ministry of Industry and Information Technology (MIIT) and MEP to jointly develop proactive policy measures to push ahead industrial restructuring, reduce the massive emissions from heavy chemical industries, as well as adjust industrial output by gradually eliminating the capacity in regions with concentrated heavy chemical industries and severe air pollution. These measures include the following suggested actions:

- **Shape a sustainable investment and consumption pattern that will reduce the dependence of local economic development on heavy chemical industries.** Increase the proportion of the tertiary industry and high value-added industries, and slow down the development of energy-consuming, high-polluting industries. It is forecasted that China will maintain stable and fast economic development in the next 15 to 20 years, the urbanization process will further accelerate, and the feature of heavy chemical industries will remain prominent. China needs to promote the development of strategic emerging industries, and guide the sustainable transformation of investment and consumption patterns via differentiated economic policies. Meanwhile, total pollutant control and energy

consumption should become drivers to achieve peak iron, steel, and cement outputs in the 13th FYP period, followed by decline in their output, with improved air quality.

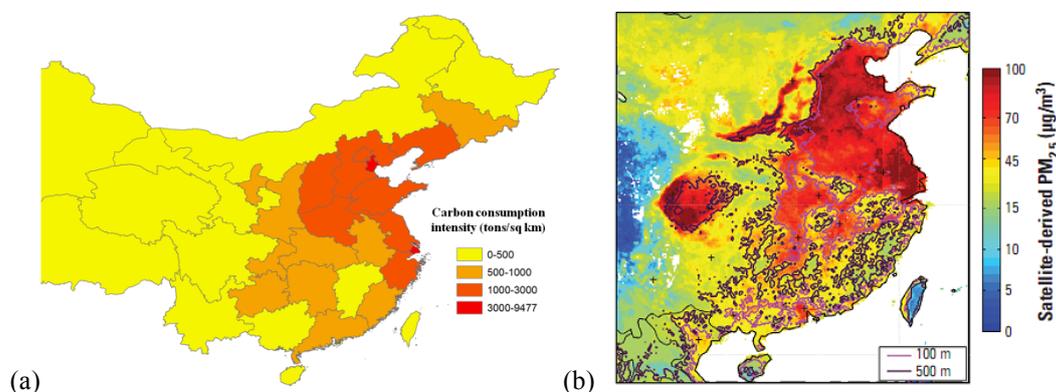
- **Improve the technical level and reduce overall energy consumption and air pollutants while enhancing the industrial output value.** China should raise the industrial access threshold, prioritize such indicators as energy-efficiency, environmental protection and security in the strict implementation of energy efficiency assessment and review, and environmental impact assessment in accordance with the law. Construction land review and loan approval should also be stricter. On the other hand, with the elimination of backward production capacity in such polluting industries as thermal power, iron and steel and building materials, China can improve the overall technical level to drive ahead industrial optimization and reduce air pollutant emissions. Throughout this process, efforts should be made to promote the universal and efficient utilization of best available technologies for cleaner production and pollutant emissions control, for instance, reducing the use of volatile materials in coating and cleaning processes. At the same time, the industrial chain should be extended and the proportion of refined high value-added products increased to reduce pollutant emissions along with the development of heavy chemical enterprises.
- **Progressively reduce the capacity of heavy chemical industries in the Beijing-Tianjin-Hebei region, Yangtze River Delta and Pearl River Delta to reduce severe combined and complex air pollution.** These regions and their cities are experiencing the transition from late industrialization to post-industrialization. In some cities and regions, with the evacuation of heavy chemical industrial production and the substantial adjustment of energy structure, the emissions of multiple atmospheric pollutants are being reduced, thus creating or having created conditions for reducing emission intensities. Strict technical and environmental requirements for access thresholds should be set for transfer of industry from these regions, so as not to affect the realization of air quality improvement goals in other areas such as Central or Western China.

4.4. Optimize the energy structure to achieve efficient, clean, and sustainable coal utilization

Coal is an important basic energy resource for China. China's coal consumption has been on a rapid rise since 2000, up from 1.4 billion tons to 3.1 billion tons in a decade. In 2010, China accounted for 48.2% of the world's total coal consumption.

Compared with clean energy such as natural gas, the coal utilization process generates more air pollutants including SO₂, PM, heavy metals and CO₂. Due to the limitations of resource endowments, coal has been in a dominant position in the energy structure. It has accounted for about 70% of primary energy consumption since the 1980s, far more than the 20% in some other countries. Such coal-dominated energy structure is an important contributor to the massive emissions of atmospheric pollutants. More specifically, it is responsible for 90% of the SO₂ emissions in China, 67% of the NO_x emissions, 40% of the soot emissions, and 70% of human-caused atmospheric mercury emissions. Coal consumption intensity is also significantly consistent with the spatial distribution of regional air pollution, especially PM_{2.5} pollution (as shown in Figure 8). In view of this, a substantial reduction of air pollutant emissions in coal combustion is a must to improve ambient air quality in China and particularly the severely contaminated eastern regions.

Figure 8. PM_{2.5} pollution in eastern regions is more serious (b), consistent with the spatial distribution of coal consumption intensity (a)



Source: Chinese Energy Statistical Yearbook 2011, China Statistical Press, 2012; van Donkelaar et al., 2010. Global Estimates of Ambient Fine Particulate Matter Concentrations from Satellite-Based Aerosol Optical Depth: Development and Application, *Environmental Health Perspectives*, 118 (6): 847-855

Energy resource endowment determines that coal will dominate China's energy structure for a long time to come. Hence only sustainable, clean and efficient coal use will provide prerequisites for controlling the emissions of air pollutants from coal combustion. It is also advised that the NDRC, MEP, and relevant ministries introduce policies for energy system optimization in order to push forward the gradual shift from coal to natural gas and other clean energy sources, the strategy of sustainable, clean, efficient use of coal, and technological advancement in the use and conservation of all energy sources. Major policies include:

- **Optimize the energy structure by reducing the proportion of coal in primary energy.** In the near future, massively increase the supply of natural gas and develop nuclear energy; in the mid- and long-term, develop wind, solar, biomass and other renewable energy sources aiming at a reduction of 3 to 5 percentage points in the proportion of coal to primary energy during each FYP period.
- **Optimize the spatial distribution of coal consumption by controlling regional total coal consumption.** Reduce coal consumption in Beijing, Shanghai and areas with high coal consumption intensity in their late stage of industrialization, and restrain the growth rate of coal consumption in eastern regions, so as to reduce coal consumption in regions with serious air pollution, including the Beijing-Tianjin-Hebei region, the Yangtze River Delta, and the Pearl River Delta.
- **Improve the coal consumption structure, promote the transfer of coal consumption to large-scale coal-fired equipment with best available technologies, and reduce the terminal coal consumption in the industrial and commercial sector.** The power sector's coal consumption should account for 60% and 65% of the total in 2020 and 2030 respectively.
- **Put emphasis on pollution control in the whole coal life cycle to advance coal washing and distribution.** Efforts should be made to increase the proportion of washed coal to more than 70% in 2030 to be in line with the international level.
- **Vigorously promote clean fuel adoption in households.** Reduce the direct combustion of raw coal and biomass in households and promote gas energy and briquette use.

In addition, China as the largest coal consumer in the world should develop and use the world's best coal-fired pollution control technologies, and gradually establish a leading position in clean coal utilization. Stringent emission standards and access

measurement method should be introduced to promote the research, development and use of best available technologies for air pollution control, such as efficient desulfurization, denitration and dust removal, and ensure the efficient and stable operation of these technologies in the coal-fired pollution source to reduce the emissions of pollutants.

4.5. Comprehensively strengthen pollution control in mobile sources

Mobile sources have become a prominent factor in causing ambient air quality problems. Mobile sources contribute 20% -25% of PM_{2.5} in major cities such as Beijing and Shanghai, as well as the eastern densely populated areas. Some factors such as the rapid increase in the vehicle population, weak promotion and ineffective enforcement of stage two vapor recovery or onboard refueling vapor recovery, and loose standards on summer time fuel vapor pressure have resulted in high VOCs emissions from gasoline vehicles, and hence lead to ozone nonattainment. Pollution from rapidly growing mobile sources has posed one of the greatest challenges in air quality management. Its control to a large extent determines whether regional air quality is effectively improved in China, but also majorly impacts the public satisfaction about relevant government policies and implementation. At present, both developed and developing countries are facing unprecedented challenges from the prevention and control of mobile source pollution and attach a high degree of attention to this issue. Countries across the world are active in summarizing lessons learned and exploring a more scientific, rational and efficient program for mobile source pollution control. China is the world's largest auto market and the rapid increase in the number of motor vehicles leads to severe congestion. Simultaneously pollutants which are not brought under effective control pose short and long-term hazards to the health of the residents in highly populated urban areas. For the purpose of effective control of mobile source pollutants, China should work out comprehensive policies regarding fuel quality, vehicle emissions standards and road use, covering mobile sources management, vehicle energy and urban planning.

With regard to fuel quality, it is necessary to rapidly introduce near zero sulfur levels in both diesel fuel and gasoline. Modern, efficient purification processing for mobile source emissions requires high quality gasoline, and diesel fuels, in which it is essential to achieve at least low-sulfur content (sulfur content less than 50ppm) or the best, near zero-sulfur content (sulfur content below 10ppm). In promoting low-sulfur and sulfur-free gasoline and diesel, only a few cities in China such as Beijing and Shanghai have made significant progress in the last decade. As a result of such slow advancement, the implementation of more stringent vehicle

emission standards has been delayed, hindering the realization of ambient air quality improvement targets. According to studies, if low-sulfur and sulfur-free fuels were introduced across the country on the schedule that MEP intended and National Emission Standards IV for heavy-duty diesel vehicles was implemented on schedule (rather than delayed 30 months), PM emissions from new trucks would have been reduced by about 80% over the level specified in National Emission Standards III and NO_x emissions by about 30%. Such a difference in emissions will impose a 5-10-year effect on ambient air pollution over the lifetime of these vehicles. In fact, large oil refineries in China are largely capable of producing low-sulfur and sulfur-free gasoline and diesel. Appropriate price policies and economic incentives could be effective in actualizing the market supply in the short term. It thus will play a substantial role in controlling mobile source pollution and improving ambient air quality. In light of this, it is recommended that the Chinese Government attach a high degree of attention to low-sulfur and sulfur-free fuels, and bestow the right of oil quality management on MEP. With a clarified schedule and firm targets, effective policies should be quickly carried out to advance the realization of low-sulfur fuel and sulfur-free fuels for vehicles and promote low-sulfur fuels in non-road mobile sources.

With regard to vehicles, accelerate the development and implementation of a full-range of emissions standards. International experience has shown that stringent emission standards provide essential regulatory conditions for mobile source pollution control. Over the past decade, China has developed a relatively strong emission standards system for vehicles which largely constrained emissions growth in spite of the tremendous increase in the vehicle population. However, in comparison with developed countries, China still lags behind in the stringency of its limits, the scope of coverage and reasonable implementation for which further improvement is required. For example, the emission standards for railways, waterway vessels, agricultural and construction machinery, power generation sets, and small general machinery with internal combustion engines, as well as the emission standards for vapor emissions during refueling and otherwise, need to be improved. For this consideration, government departments should accelerate the development and implementation of full-range emission standards for internal combustion engines with wide participation from all walks of life (not limited to people engaged in internal combustion engines) for opinions and suggestions. Such standards shall take into account the world's most advanced and reasonable technical requirements, and be promulgated as soon as possible. Advanced, rigorous standards are expected to actively promote the innovation and development of partial zero emissions vehicles

(P-ZEV) and zero emissions vehicles (ZEV), and pose requirements on emission processes not covered by the current standards (such as VOCs emissions in gasoline refueling process). China is advised to advance the implementation of as rigorous and comprehensive as possible set of emission standards consistent with the availability of low sulfur and ultra low sulfur fuels. New diesel vehicles should be required to meet the National Emission Standards V as soon as possible but no later than in 2015 and Euro VI standards requiring active regeneration diesel particulate filters (DPF) should be required in key regions and cities by the same time. New light gasoline vehicles should be required to adopt all the emission control measures specified in National Emission Standards V, including the on-board refueling vapor recovery (ORVR) which controls refueling vehicle emissions as soon as possible. In addition, if fuel quality conditions permit, it is encouraged to carry out retrofit projects for diesel vehicles. A clear roadmap regarding fuel quality and emissions standards for all categories of on and off road vehicles should be a high priority for MEP in the immediate future.

In the aspect of roads, create a new sustainable urban transport system. Developed countries' experience and lessons learned show that a sustainable urban transport system is crucial to traffic pollution control. A new, characteristic urban transport system is required, which emphasizes the development and design of urban public transport, cycle track and pedestrian walkway design, and traffic optimization, and introduces such management means as low-emission zones and zero-emission zones, green passenger and freight transport, and peak traffic management. It is advised to delineate low-emission zones and zero-emission zones in cities in urgent need of air pollution control and work out appropriate management measures in 2013, so as to reduce the emissions of buses and taxis in such zones. Peak and traffic management of high-emission private cars is also recommended.

In addition to the above three, vessels have been significant emission sources polluting the air of port cities such as Shanghai, Shenzhen, Guangzhou, Nanjing and Ningbo. However, the local government is not able to effectively supervise these sources based on the existing management framework. A cooperative mechanism should be established between the Ministry of Environmental Protection and the Ministry of Transportation to identify the duty and responsibility in local vessel emission control. China should implement a vessel sulfur emissions control zone in Yangzi River Delta (YRD) and Pearl River Delta (PRD), and install the shore side electricity facilities in ports. Emission standards, oil standards and management standards should also be introduced as soon as possible for non-road mobile sources

such as construction and agriculture machineries, and locomotives.

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