

**Report of the CCICED Task Force *Policy Mechanisms for
Achieving the Environmental Targets of the 11th Five-Year Plan***

Executive Summary

**ENSURING THE ACHIEVEMENT OF EMISSION REDUCTION
TARGETS BY IMPROVING POLICY IMPLEMENTATION
MECHANISMS**

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Introduction

At present, environmental pollution in China is still increasing, with emissions of major pollutants showing no sign of decrease and exceeding environmental carrying capacity. Environmental pollution has seriously constrained sustainable social and economic development in China and affected the improvement of public health and living standards. To implement the scientific approach to development, the Chinese Government developed the Outline of the 11th Five-Year Plan for National Economic and Social Development (hereinafter referred to as the Outline). The Outline identifies the following binding targets: energy consumption per unit GDP should be reduced by 20% and the total emission of major pollutants by 10% by 2010 compared with that of 2005. Against this background, CCICED decided to establish the Task Force (TF) on Policy Mechanisms for Achieving the Environmental Targets of the 11th Five-Year Plan. This TF has studied the policy implementation mechanisms for reducing emissions of major pollutants including COD and SO₂ and put forward measures and policy recommendations to the Chinese Government for meeting the emission reduction targets during the 11th Five-Year Plan period. Based on the investigation of local practice in many areas, and the study of the experience of developed countries in emission reduction, the TF has drafted the Report on Policy Mechanisms for Achieving Environmental Targets the 11th Five-Year Plan. This Executive Summary of the report, will be submitted to the First Annual General Meeting of CCICED Phase IV.

Part A: Analysis of Current Emission Reduction Efforts in China

A.1 Achieving the pollution reduction targets is a difficult challenge

1. Energy saving and pollution reduction is an important strategy of the Chinese Government to implement the scientific approach to development. The implementation of the strategy on energy saving and emission reduction is an important means for the Chinese Government to the scientific approach to development and to develop a socialist, harmonious society. It is also the necessary condition for building “a resource-saving and environment-friendly society”; and the only path for China to follow to facilitate economic restructuring and the transformation of the mode of development. In addition, it is the prerequisite for

raising living standards and maintaining the long-term interests of the Chinese nation. The implementation of energy saving and emission reduction is the basic guarantee for achieving good environmental quality in functional areas, and a powerful means for facilitating the strategic adjustment of the economic structure and a fundamental shift in the mode of growth . It contributes to the promotion of technological advancement and resource saving; implementation of national industrial policies; the achievement of rational allocation of environmental resources, and supporting initiatives in the prevention and control of pollution. At the same time, with the mainstreaming of the emission reduction target into the national economic and social development plan, the total emission control system has become a tool for environmental protection departments to be involved in comprehensive decision-making processes.

2. Pollution reduction is the top priority in environmental protection for China during the 11th Five-Year Plan period. It is expected that by the end of 2010, total emissions of COD and SO₂ will be reduced by 10% compared with that of 2005. This is the solemn commitment of the Chinese Government to the Chinese people and to the world, and binding environmental targets that must be met. This is well-regarded by the international community. The key to meeting these targets lies in the integration and combination of approaches such as end-of-pipe control, consumption of energy and resources, clean production, technological advancement, industrial pollution control, supervision and management. The TF holds the view that pollution reduction is fundamentally not only an environmental issue but also a socioeconomic and political issue. Therefore, Chinese environmental policy mechanisms need to be reformed, focusing on total emission control in coming years. It means, taking pollution reduction as a core task, and systematically establishing mechanisms that promote minimization of the consumption of resources and energy, improvement of the quality of economic development and the enhancement of industrial pollution control. In doing so, the reduction of total emissions will not be just a paper exercise.

3. Meeting the pollution reduction targets is a difficult challenge. The Chinese Government has taken unprecedented policy and project measures to carry out emission reduction work in a balanced way since 2006. Environmental protection departments and local governments have made great efforts in this respect. However, the emission reduction target in 2006 was not met. Our study shows that the control of new sources of emissions should be the first priority in emission reduction. The main uncertainty in meeting emission reduction targets stems from the uncontrollability of economic and social development. Initial emission reduction programs were based on the assumption of average annual GDP growth of 7.5%. If annual GDP growth is 10%,

it means 350 million t more coal would be consumed and 1.8 million t more emissions of SO₂ each year compared with the 7.5% growth scenario. The corresponding changes in the emission reduction target, uncertainty about achieving the energy & resource saving targets, and the actual implementation of relevant policies are all factors that cannot be fully controlled, affecting the achievement of the emission reduction targets. It is our judgment that the realization of pollution reduction targets is a very difficult task. We should not be blindly optimistic. The possibility of meeting the SO₂ reduction target is better than for COD

4. Addressing some systemic problems in emission reduction. At present, there are some structural defects in the emission reduction program. Three main factors affect the continuity of emission reduction, and some fundamental reforms are needed. 1) Government environment investment is inadequate. Problems exist in measuring environmental investments, and in the division of responsibilities, and performance management, for environmental investment. Presently, the construction of pollution reduction projects is often behind schedule. The quality of projects is also a major concern. For example, support for COD reduction has not fully been in place, especially public investments. 2) Government enforcement capacity and programs are not sufficient. Discharge/emission standards are not comprehensive and not fully enforced. This has major negative impacts on pollution reduction. 3) There are fundamental weaknesses in policy formulation and implementation, in particular the economic policies that ensure the operation and continuous emission reduction of the pollution control facilities, including both incentive and punitive policies. At present, some policies are in contradiction with the requirements of pollution reduction, and some pollution reduction policies are not strong enough to support continuous pollution reduction.

A.2 Pollution Reduction Is a Socioeconomic and Political Issue

5. Environmental issues reflect social and economic as well as environmental dimensions. The continuous economic growth and urbanization in China over the last 30 years has been at the cost of the over-exploitation of environmental and natural resources. The pollution load is directly correlated with population, per capita GDP growth rate, and pollution intensity (emitted pollutant per unit of GDP). To address environmental issues, we must seek the solutions in corresponding social and economic systems. Starting from the “independent variables” in the social and economic spheres, we can identify the right key to address the “dependent variable” in the environmental sphere. International experience shows that solutions to environmental issues can only be addressed in the context of the whole socio-economic system. Pollution reduction indicators should be considered in relation to the social and economic dimensions. Greater efforts should be made in

addressing the systematic, coordinated, and balanced relationship between the socio-economic and environmental systems, and the sustainability of their development using an integrated approach, rather than dealing with each issue in isolation. The responsibility of governments for pollution reduction should be further emphasized through performance assessment indicators. A comprehensive pollution reduction strategy should be implemented. Public participation should be promoted as part of these efforts. Only in this way can we avoid the situation where there are targets but no effective control, and emission reduction becomes a game of numbers for local environmental protection efforts.

6. Pollutant emission indicators reflect the quality of economic development.

In general, pollutant emissions are indicators of the status and quality of economic growth. With rapid GDP growth, even though emission intensity of industrial pollutants shows some reduction, it is still far higher than that of developed countries. There has been no fundamental change in the mode of development featuring high input of energy and resources, and high consumption and heavy pollution, resulting in huge total emissions of pollutants and heavy loss of environmental resources. **The** main industries that drive China's GDP growth are those with high energy consumption and heavy pollution. In the first five months in 2007, the medium- and long-term loans from major financial institutions to six line industries characterized by heavy pollution and high energy consumption have increased by 21.8% than corresponding period in 2006. Industries such as heavy chemicals, thermal power, metallurgy, and cement are still the biggest contributors to emissions. The technological level of these line industries is comparatively low, with few high quality products and low economies of scale. The construction of small-sized steel, cement, and power plants which are "prohibited or restricted" internationally is still booming in some areas, resulting in surplus production capacity. Meanwhile, heavy-polluting industries phased out by the eastern regions have been transferred to the western and other under-developed parts of China. In addition, the power industry is using the excuse of heat-electricity co-generation to expand its productivity, while supporting the fast development of the energy-intensive aluminum and coal sectors. At the same time, 33% of increased steel production is for export. Coke exports from China account for over 50% of the total export volume in the world. It is estimated that the 26% of China's energy consumption is related to exports. China has suffered a huge "environmental deficit" while enjoying huge trade surplus – exporting huge amounts of products while leaving pollution in China is equivalent to importing pollution. For example, during the 10th Five-Year Plan period, the annual SO₂ "deficit" was 1.5 million tons.

7. Changing the mode of economic development is a prerequisite for achieving the pollution reduction targets. The emission reduction target could not be achieved in isolation from GDP, energy and water consumption, technological advancement and industrial structure. Pollution reduction is not necessarily a constraint on development. Rather it should result in sustainable and coordinated economic and social development. The change from an extensive mode of economic development must be achieved through the control of total emissions. The transformation of the mode of economic development is the prerequisite for the eventual achievement of the pollution reduction targets. From this perspective, the root cause of the failure to meet the environmental targets during the 10th Five-Year Plan period lies in the quality of economic development. During the 10th Five-Year Plan period, the average annual GDP growth rate was 9.5% with total growth of 58% in five years, 14.3% more than originally planned (average annual growth had been projected as 7.5% and total growth, 43.6%). The heavy polluting sectors of steel, cement, power, ethylene and paper increased by 175%, 68%, 84%, 61% and 149% respectively, much higher than the growth of GDP. From this perspective, the failure to meet the 10th Five-Year Plan environment targets is understandable. At present some local authorities still take emission reduction and economic development as two antagonistic objectives and have explicitly or implicitly resist emission reduction work., In such situations, the pollution reduction and economic development plans remain separate, with the latter much more stronger than the former.

8. Pollution reduction has become a political issue facing the Chinese government. China ranks first in the world for emissions of several pollutants (i.e. SO₂, COD, POPs and mercury, etc.), even though the per capita level is still low. Emission reduction is the solemn commitment of the Chinese Government to the world and is well-regarded by the international community. It has become a political issue that directly influences the development of a harmonious society in China, and coordinated regional development. The governments at different levels are the main entities responsible for the implementation of the pollution reduction. Progress in meeting the pollution reduction targets will be directly linked to the performance of local governments.

A.3 Achieving the “dynamic” emission reduction target is more difficult than achieving the “static” one

9. Reducing emissions by 10% compared to 2005 is a static target that does not take account of economic growth; when this is done, the reduction target is far higher than 10%. The target of the Chinese Government to reduce by

10% the total emissions of COD and SO₂ by the end of 2010 compared with that of 2005 is a static and absolute target. If GDP grows at 7.5% annually on average from 2006 to 2010, and the energy saving target is met with environmental protection measures integrated into new projects, it is expected that this would generate an additional amount of about 1.87 million t of SO₂ and 3.1 million t of COD compared to 2005. The required reduction target would then amount to 4.9 million t SO₂ and 4.51 million t COD, equivalent to 19% reduction of SO₂ and 32% reduction of COD compared to the 2005 baseline. If annual GDP growth is 10%, it is expected that SO₂ and COD emissions would increase by 3.7 million t and 4.3 million t respectively. On this scenario, the required total emission reduction of SO₂ and COD would be 6.73 million t and 5.71 million t respectively, equivalent to 26% reduction of SO₂ and 40% reduction of COD compared with that of 2005. This is 16 and 30 percentage points higher than the static scenario. In other words, with a 10% reduction in f existing pollution, China would have to reduce all incremental emissions from new development projects. The dynamic reduction target for most provinces and municipalities is 2—8 times higher than the static target. However, many provinces and municipalities still do not understand this. Instead, they just evenly divide the static emission reduction target allocated by the immediate upper level government authority among the 5 years. This will certainly result in the failure to meet the dynamic pollution reduction targets by the end of 11th Five-Year Plan period..

10. Controlling emissions from new pollution sources should be the first priority, followed by the reducing emissions from existing facilities. International experience shows that environmental problems must be addressed in the context of the overall social and economic system. Over the past 30 years, the social and economic development of developed countries has been achieved with a stable consumption intensity of resources and energy. This is the physical prerequisite for reaching the “tipping point” total emissions of pollutants is controlled and gradually reduced. Right now, China’s mode of economic growth is still extensive involving the consumption of huge amounts of energy and resources in proportion to the increase of GDP. Therefore, it is very difficult to meet the energy saving and emission reduction targets. During the “11th Five-Year Plan” period, preventing the incremental generation of pollution at source by changing the mode of development mode will be more important than increasing pollution control at the end of pipe. This is the core of emission reduction work.

11. The additional pollution generated by economic development will make achieving pollution reduction targets more difficult. Rapid economic growth, and difficulties in controlling consumption of resources and energy, will generate additional pollution, and the dynamic pollution reduction target may exceed the pollution reduction capacity that was originally planned. Analysis shows that even if the energy saving target is met on schedule, with environmental protection

measures for new projects in place, SO₂ emission will still increase by 771,000 t and COD by 675,000 t for each 1% growth of GDP during the “11th Five-Year Plan” period. If annual average economic growth during the “11th Five-Year Plan” period is higher than 10%, the required COD reduction amount would be larger than the planned reduction capacity, making it extremely difficult to meet the COD reduction target. If there is no fundamental change of the current mode of economic growths driven by heavy chemical industry and with economic growth at 10% annually, then energy consumption per unit of GDP in 2010 could only decrease by 15-16% from the level of 2005. In short: as long as annual economic growth exceeds 10%, and goes beyond the assumptions of the originally-designed pollution reduction program, it will be extremely difficult to meet the COD and SO₂ emission reduction targets. Additional policies and measures would be needed.

A.4 Achieving the Energy Saving Target is Essential for Meeting the Emission Reduction Target

12. The energy saving target is a “soft constraint”, linked to the rate of economic growth. Energy consumption per 10,000 yuan GDP – energy intensity - is a ratio. As long as the rate of growth in energy consumption is less than that of GDP, then energy intensity will decrease. This can be achieved through technological advancement, higher energy efficiency or a change in the energy mix. From the perspective of economic efficiency, the decline in energy and resource intensity is an inexorable trend. In China the average annual decline of energy intensity was 4.5% from 1978 to 2004. There were only four years when the energy elasticity coefficient exceeded 1 (1989, and 2002-2004). At the macro level (nation wide and 5 year time span), the decline of the consumption of energy and resource is almost inevitable. The current energy saving target is just a quantification of this trend. Judging from the economic development trend during the “10th Five-Year Plan” period, it is expected that the energy saving target and water saving target will be probably be met “automatically”, even with higher-than-expected GDP growth. However, the absolute increase of energy and water consumption will exceed the expected figures. According to estimates, if China achieves a 20% reduction of energy intensity by 2010, total energy consumption will increase by 18% compared with that of 2005 (assuming annual GDP growth at 8%). Therefore, the pressure of energy consumption on the environment will continue, but with a reduced rate of increase.

13. The emission reduction target is a “rigid constraint” requiring an absolute reduction of total emissions. Pollution reduction and energy saving are two binding targets set in the 11th Five-Year Plan with a close relationship but fundamentally different in nature. The emission reduction target requires the absolute reduction of total emissions, and the subject is the total emission in a given period. Without a fundamental change in the mode of economic growth, faster

economic growth and the larger size of total GDP size increases the pollution reduction challenge. SO₂ emissions will increase by 771,000 t and COD by 675,000 t for each 1% growth of GDP during the “11th Five-Year Plan” period. The emission reduction target is a “rigid constraint” which is a challenge the “GDP-ism” prevailing in some areas. During the “10th Five-Year Plan” period, COD discharge per 10,000 yuan GDP actually declined by 47%. However, the reduction of total emission failed to meet the target.

14. The achievement of the energy saving target is a necessary but not sufficient condition for achieving the SO₂ reduction target. Analysis shows that under a 10% GDP growth scenario, a 20% reduction of energy consumption would result in the equivalent of a 45% reduction of the required dynamic reduction target of SO₂ emissions. Supposing that there is no change in in the energy mix, and annual GDP growth of 10% during the “11th Five-Year Plan” period, if no emission reduction measures are taken meeting the 10% SO₂ emission reduction target would depend exclusively on energy saving. On this scenario, energy consumption per 10,000 yuan GDP would have to decrease by 44% during the “11th Five-Year Plan” period. Obviously this is not feasible.. If energy intensity only reduced by 15-16%,then SO₂ emission would increase by 1.035 million tons, close to the planned reduction capacity limit. If energy intensity is reduced by less than 15%, the SO₂ emission reduction target could not be met. If the energy saving and water saving targets are not met, it will be extremely difficult to a 10% reduction inSO₂ emissions and in discharges of COD.

15. There is uncertainty about whether the energy saving target will be met, posing a risk that the pollution reduction target will not be met. Restructuring is often a positive factor for energy efficiency. However, the new round of industrial restructuring since 2002 involving the rapid development of the heavy chemical industry has increased energy consumption, increasing the difficulty of achieving the energy saving target. The energy saving target in the 2006 pollution reduction scheme has not been met. This increases the difficulty of achieving the pollution reduction target in the later phase of the 11th Five-Year Plan period. For the 20% energy reduction target, each one-percentage point that it is not met results in 207,000 tons more SO₂ emissions. If the coal proportion of the energy mix increases by one percentage point, it would add 172,000 t more emissions of SO₂ each year. Study results shows that, during the 11th Five-Year Plan period, if GDP grows at 10%, achieving the pollution reduction target would require that all supporting policies such as the quality of economic development, energy saving, investment in pollution control, policy formulation and implementation, etc. would have to be fully implemented. On a business as usual scenario, and with GDP growth over 10%, the pollution reduction target is unlikely to be achieved.

A.5 The Existing Emission Reduction Program Cannot Ensure that the Emission Reduction Target Will Be Met

16. The slow development of the urban sewage pipe network seriously hinders COD reduction. At present, the development of urban sewage treatment plants across China is hindered by the size of the task, including the volume of investments required, and the long construction cycle. The demand for the construction of supporting pipelines further constrains normal operation of completed sewage treatment plants. To meet the target of new urban sewage treatment capacity of 45 million t per day under the plan, more than 160,000 km of new sewage pipelines need to be put in place. However, the total length of existing sewage pipelines across China up to the end of 2004 was only 78,000 km. The ability to construct 45 million tons of new urban sewage treatment capacity tons per day will directly affect the achievement of the COD reduction target in China.

17. Insufficient attention to sludge treatment at urban sewage plants. Sludge treatment and disposal are not given enough attention in COD reduction work. In general, sludge accounts for 0.3%~0.5% of total treated sewage (by volume), or 1%~2% (by dry weight). In case of tertiary treatment, sludge amount would increase by 0.5~1 times. An additional treatment capacity of 45 million t per day for urban sewage would result in an increase of at least 450,000 t sludge every day. In the absence of effective treatment, this will cause secondary pollution. In fact, it just transfers COD from the water to the sludge phase, with no actual discharge reduction.

18. The reduction of COD at industrial enterprises has not been achieved. Reducing COD in some heavy water-polluting industries such as paper and chemicals has not been plants are scattered across the country and there is no vertical management structure as in the power industry. According to the Program of the State Council on Comprehensive Work for Energy Saving and Emission Reduction, 50% of the task of reducing industrial COD depends on restructuring. The experience of China during the “9th Five-Year Plan” and “10th Five-Year Plan” periods show that it is often difficult to implement the policy of phasing-out inefficient plants through industrial restructuring due to local protectionism. This often leads to stop-and-start again production, or of factories closing down but not stopping operation. The other 1.40 million t reduction of industrial COD depends on clean production and end-of-pipe treatment. However, the available environmental information mostly concerns well-established large- and medium-sized industrial enterprises with relatively good performance. Less information is available on small industrial enterprises with high COD discharges, uneven performance in meeting the discharge standard, poor or no treatment technology. As a result, they are often not subject to control. In addition, the existing industrial effluent discharge standards for some industries are rather loose, and the total emission control target is not broken

down for each industry, making it hard to achieve a sustained reduction in emissions. There are many industries with complex effluents where it is not easy to identify a good starting point for COD reduction. The Program of the State Council on *Comprehensive Work for Energy Saving and Emission Reduction* needs to specify more detailed requirements in terms of end-of-pipe treatment and emission reduction in order to make it more workable.

19. SO₂ reduction heavily depends on desulphurization equipment at thermal power plants. During the “11th Five-Year Plan” period, power-generating units with a total capacity of 355 million kW will have desulphurization equipment installed according to the plan. Of this, 188 million kW will be newly built coal-fired power plants where the sulfur removing equipment will be installed and put into operation simultaneously with the power generation equipment. Existing coal-fired power plants with total capacity of 167 million kW account for the rest. This will represent a total SO₂ reduction capacity of 5.90 million t, accounting for about 70% of the total capacity of all reduction measures put forward by the Program on Comprehensive Work for Energy Saving and Emission Reduction. It is expected that the desulphurization rate of thermal power generating units in China will reach 64% by 2010. Taking account of about 10% of facilities that cannot be retrofitted, the potential for further desulphurization coal-fired power plants will greatly decline. However, the authorities have only presented general principles regarding requirements for non-thermal-power industries that have close relations with the improvement of regional environmental quality, without any specific tools, objectives, measures and policies. The SO₂ reduction program during the “11th Five-Year Plan” period depends too heavily on desulphurization projects of big thermal plants. This makes the program rigid and vulnerable.

20. The consumption of coal in non-power industries is underestimated; and it is difficult to maintain the current coal consumption of coal-fired industrial boilers. If the energy-saving target is met, and GDP grows at 10%, then energy demand will reach about 2.82 billion tones of coal equivalent by 2010, an increase of 540 million t in 5 years. Part of this study involved making an estimation of the breakdown of the increase in coal consumption in different sectors. It is expected that by the end of 2010, the total capacity of thermal power plants across China will reach 620 million kW, with annual electricity generation increasing from 2.04 trillion kWh in 2005 to 3.16 trillion kWh in 2010, and an increase in coal consumption of 477 million tones. According to the industrial development and energy plans, coal consumption in the steel, building materials and synthetic ammonia industries will increase by at least 170 million tones. The total increase of coal consumption in both coal-fired power plants and industrial production processes will be 647 million tones, almost equal to the entire predicted increase. This indicates that the achievement of the SO₂ emission reduction is predicated on their being no growth in total coal consumption in non-power industrial boilers

during the “11th Five-Year Plan” period. Clearly this is too optimistic. In 2005, total coal consumption in non-power industries accounted for 55% of the total. The annual growth rate of coal consumption in three major non-power industries of iron and steel, building materials and chemicals is 9%. Coal consumption for all industrial boilers across China went up from 320 million t in 2000 to 458 million t in 2005, with an annual average growth of 7.8%. Taking account of such factors as energy saving during the “11th Five-Year Plan” period, the coal demand of industrial boilers across China will increase by 126 million t. It is predicted that, if there is no change in the present development plan, the total energy demand in China will go up to 3.02 billion tones of coal equivalent in 2010 with only a 16% decline in energy intensity compared to 2005. Taking the new increase in non-power industries into account, there will be no any spare room in the planned pollution reduction capacity. In a word, in the scenario of 10% GDP growth, achieving the energy saving and pollution reduction targets will require additional strong measures to curb the development of high energy-consuming industries and to strengthen pollution reduction in non-power industries.

21. Insufficient attention to coal washing for SO₂ reduction. Analysis conducted for this study show that washing 100 million tons coal could reduce emissions of SO₂ by 600,000-700,000 t, reduce transportation load by 10 billion t-km, and raise combustion efficiency by 10-15% thereby generating substantial environmental and economic benefits. Strong demand has made the coal industry put more emphasis on quantity than quality. Necessary technological change has not been implemented for industrial kilns, boilers, and coal washing plants. Not enough capacity for loading, transporting, and storing washed coal has been established. Pricing and investment have not been used enough to encourage coal washing. All these factors have led to situation where coal washing has long been neglected. The cost of coal washing per ton in China ranges between 12 to 15 yuan RMB (7-8 yuan higher than that of developed countries). There is no standardized classification system for coal, and no strict policy for linking the use of different categories of coal with their possible environmental impacts. In 2005, China produced 2.19 billion tons of coal, of which 703 million tons was washed, This amounted to 32% of the total, much lower than that in developed countries (55% in Germany, 75% in Australia, 95% in Canada, and 75% in UK). The ash content in commercial coal is about 20.5%. The coal consumption in non-power industries accounts for 50% of the total. Using unwashed coal in non-power industries has a severe negative impact on energy saving and pollution reduction. (1% ash content reduction in coking coal can result in a 1.33% reduction in the ash content of coke, and subsequently a 2.66% reduction in coke consumption, and a 3.99% increase in utilization coefficient of the blast furnace

22. Optimizing an energy mix dominated by coal is a big challenge. 90% of total SO₂ emissions are related to energy use. At present, coal accounts for about

69% of the primary energy mix in China (2005), 42% higher than the world average. In recent years, the development of other energy sources like hydropower, nuclear power and new energy sources has received more attention. At the same time, the installed capacity of thermal power has maintained a high growth rate over the past years. According to the latest development plan for the power industry, there will be no major adjustment to the power generation mix that will continue to be dominated by coal. It is also impossible to change the primary energy mix dominated by coal. In this context, China should facilitate the optimization of the energy mix and further strengthen measures for SO₂ emission reduction.

23. Estimating the SO₂ reduction capacity is very uncertain. The assessment of SO₂ treatment capacity in the Acid Rain Plan is derived from an estimate of the material balance. It is assumed that the coal sulfur conversion coefficient is 0.8, and average sulfur content of coal 0.8%. However, some findings suggest that the percentage of coal with less than 1% sulfur level in China is only 20%. With the increasing depth of coal mining, the average sulfur content in coal will increase. In the past few years, the sulphur content in the coal burned by the six largest power companies has been higher than 1%. The conversion coefficient of coal sulfur at the newly installed power generating units can reach 0.8~0.95. Thus combustion efficiency and coal sulfur content could generate at least 4 million t more SO₂ emissions in coal-fired power plants (or 1 million tons more after desulphurization in coal fired power plants) – increasing the risk of not achieving the pollution reduction target.

A.6 Implementation of the emission reduction policy will not result in sustained emissions reduction

24. There are clear weaknesses in the system of emissions standards. For a long time, local emission standards in China have not developed sufficiently, while national discharge/emission standards cannot meet the special requirements of every region. The discharge/emission standards in some line industries have not been revised with the increasing requirements for environmental protection. There are many cases the technology used in development project is out-of-date and subject to phasing out by the time the project is completed. Taking the paper industry as an example, existing effluent discharge standards for the paper industry are equivalent to the world average level in 1990s. In most pulp plants, the water withdrawal for per ton of pulp is two times of that in the developed countries. Only 2% of the paper & pulp enterprises reach the world average size. In many local areas, the contribution of the paper & pulp industry is less than 5%, whereas its contribution to COD discharge is as high as 50%. Some local industrial parks (zones) have become “enclaves” where, national law enforcement forces cannot enter, and havens for enterprises that should have been prohibited or phased out according to national regulations. Some local authorities give the green light to new projects with high

energy consumption and heavy pollution, making some “industrial parks (zones)” as “dirty places” that do not comply with national emission standard.

25. Lack of supporting policies for industrial restructuring. In most cases, industrial restructuring has been implemented by administrative means involving short-term measures, implemented in a certain period of time and without supporting policies. This results in some cases where pollution has been moved from one place to another. The implementation of industrial restructuring is very difficult because it involves many factors such as shutting down polluting enterprises, finding new jobs for affected workers and a decrease of local tax revenue. Special attention should be paid to progress in shutting down small thermal power plants across China with a total capacity of 50 million kW, as it will impact on the achievement of the SO₂ emission reduction target. Except for the closure of small thermal power plants, China lacks compensation policies for other industries. In addition, the arbitrariness and lack of a long-term policy mechanism for some industries increases the cost of industrial restructuring.

26. Some national policies go against the requirements for emission reduction. Though the message on energy saving and pollution reduction is clear and strong, it has not been turned into price signals and more stringent law enforcement. The existing taxation system, which establishes VAT as the main revenue source and where enterprises pay tax to local government, has encouraged the development of high energy-consuming and heavy polluting industries. On one hand, a change in the mode of growth is required, but, on the other hand, administrative intervention maintains resource-intensive growth and inhibits the development of market mechanisms. For example, recycling and efficient use of resources is called for, yet recycling companies often cannot get support and are discriminated against. The Chinese Government is taking measures to stabilize the consumption price index (CPI) to improve the livelihood of the people. However, these policies limit the room for raising the price of resources and environmental services. Some findings show that the cost of complying with laws is 46 times the cost of non-compliance. The rate of pollutant discharge fee has long been under-assessed. Many enterprises prefer paying the discharge fee to acquire the right to discharge pollutants legally rather than to treat them. This is one of the reasons why laws are not fully observed or strictly enforced. The central government recently issued a policy to encourage a reduction in agricultural crop output and to raise the proportion of livestock output. However, if the authority does not put in place adequate control measures, it will aggravate pollution from livestock and fowl farms as well as agricultural non-point pollution.

27. Administrative policies should be reformed based on emission reduction requirements. Though current emission reduction targets focus on total emissions control, the lack of a binding policy to control the total volume of emissions means

that they primarily focus on pollution concentration. This not only means that there is insufficient information about total emissions, but also that pollution concentration is the focus during assessments at the construction phase. The system requiring polluting enterprises to treat pollution in a given period is also based on a concentration standard rather than a total emission reduction target set at regional level. In addition, the total emission targets in EIAs of new construction projects are not subject to an emission reduction target at regional level. There even exists where big thermal power plants have repeatedly used the emission quota of “closed-on-paper” plants to obtain emission quota for new projects.

A.7 Insufficient public financial support is still a key factor constraining emission reduction policies

28. Lack of financial mechanism contributed to the failure to meet the emission reduction target during the 10th Five-Year Plan period. Various problems exist with public environmental finance that impedes the achievement of the emission reduction target: an insufficient amount, too many recipients, low efficiency and lack of government guidance in pollution control investment. Financing is one of the main factors constraining the achievement of the emission reduction target. Emission reduction work cannot be completed without necessary investment. During the “10th Five-Year Plan” period, the Chinese Government increased investments in environmental protection, with an accumulated input of over 68 billion yuan from the central budget. However, the total investment and its focus were not sufficient to meet the demand for environmental control. During the “10th Five-Year Plan” period, of the 2,130 pollution control projects identified under the national plan, 1,378 were finished, accounting for 65% of the total. A total of 86.4 billion yuan were made available, accounting for 53% of the total. The pollution treatment projects in the key river basins and regions including the “three big rivers” and “three lakes” represented about 60% of the total. The development of desulphurization projects lagged behind the requirements of total emission control. The plan required the reduction of 1.05 million t SO₂, but only 70% of them were finished. Desulphurization projects lack financial and policy support. It is for this reason that the “10th Five-Year Plan” emission reduction target was not met. During the “11th Five-Year Plan” period the demand for pollution control investment to achieve the pollution reduction target will be much larger than in the “10th Five-Year Plan” period.

29. Environmental investment for pollution control is not sufficient. At present, the size of environmental investment is over-estimated because some categories of investments with indirect environmental benefit, such as green areas and landscape projects, have been included in the government’s statistics. This is quite different from the approaches developed by OECD and European countries, and it conceals the fact that the actual environmental investment is inadequate. If

only investments in sewage treatment and garbage disposal are included as investments in urban environmental infrastructure, then this category of is only about 50% of the official figure. Thus, environmental protection investment using the most commonly-used international definition is about 0.6% of the GDP, rather than the official figure of 1.3%. In general, China is still at the stage of acquiring “new debts” for environmental pollution and not at the stage when the historical debts are being repaid on a large scale.

30. Challenges securing funds during the 11th Five-Year Plan period for emission reductions. According to the 11th Five-Year National Plan for Environmental Protection and the National Plan for Key Projects, total demand for investment in pollution treatment during the “11th Five-Year Plan” period is estimated to be approximately 1530 billion yuan (an increase of 82% relative to the 840 billion yuan investment demand of the 10th Five-Year Plan period). This amounts to 1.35% of GDP for the same period (an increase of 0.16 percentage point over the 10th Five-Year Plan period). This is about 3.06% of total government investment in social fixed assets (an increase of 0.26 percentage point over the 10th Five-Year Plan period). In 2006, nominal environmental investment in China accounted for 1.23% of GDP, a relatively large drop compared with the past two years. At this level, it is apparent that the “paying old debts without creating new debts” requirement will not be met. At present, there is big gap in emission reduction investment, especially the allocation of government funds. Of the 150 billion yuan fund that the Central government planned to allocate, only 35 billion yuan have been allocated. The national budget does not include a special environmental protection fund. In many local governments the “221” budgetary item for environmental protection is unfunded. Many pollution reduction projects are waiting for government investment.

31. Enterprises have no feasible financing channel for pollution treatment. According to the 11th Five-Year National Plan for Environmental Protection, enterprises are required to raise 45% of the environmental investment of 690 billion yuan. However, there are no feasible channels for enterprises to raise such funds, so it is difficult to guarantee the investments. There are two reasons for the lack of financing channels: 1) enterprises find it difficult to attract funds for investment in pollution control projects and it is often difficult to obtain bank loans. Enterprises with heavy pollution often have poor operations; and enterprises with lower profits often face more challenging emission reduction goals. Thus, such enterprises are in a situation of “willing to treat pollution but unable to get loans”. 2) In the past, enterprises were able to invest 7% of revenues for investment in environmental technology. The policy that allows enterprises to take a tax credit for five years for investments in pollution control and treatment is now meaningless as this policy was established for most state-owned enterprises. The previous investment channels and policies have been ineffective and new investment channels, incentive policies, and

supporting measures have not been established under the new financial and taxation system.

32. Economic policies constraining emissions are not fully in place. Existing policies on investment in, and financing for, emission reduction are not complete and cannot comprehensively support emission reduction work. At present, there are still problems such as the narrow scope of collections, incomplete and inconsistent implementation, low charge rates, weak enforcement abilities for fee collection and low efficiency of fund management in China. In addition, China does not have taxes encouraging environmental protection. Existing environmental taxation measures are not complete, providing only general requirements. For example, the newly introduced resource tax is limited, targeting only mineral resources. It does not collect tax for such resources as high-sulfur coal, water and biological resources. Therefore, it is necessary to further strengthen efforts in reforming and improving the investment and financing policies for emission reductions.

33. Lack of clarity about government responsibility and financing power for emission reductions. First, there is some ambiguity of government authority. The government usually controls some functions with “rent seeking” interests that may be subject to market forces. But some basic public service functions that the government is supposed to provide have not been implemented effectively under the banner of “market reform”. Governments often invest through “market mechanism” without paying enough attention to problems of market and policy ineffectiveness. Second, there is no clear division of the distribution of authority among different levels of government. The Environmental Protection Law in principle stipulates the scope of the central and local governments’ responsibilities for environmental protection. However, there is no workable program that clarifies their authority in environmental protection. In fact, there is no evident difference in the environmental authority among government at all levels; leading to the phenomenon that no one is responsible for environmental protection. Third, there is a big gap between central-local government financial and taxation authority and the central-local government environmental authority. In 2004, local financial revenues accounted for about 45% of total national financial revenue. However, local expenditure accounted for 72% of national expenditure, indicating the inconsistency of local taxation authority and financial power. Under the current taxation regime, the financial authority has moved centrally, and the investment responsibility has moved to the local levels. There is a severe imbalance between the local governments’ taxation authority and investment responsibility of pollution control. These have aggravated the difficulty in facilitating emission reduction work.

A.8 Effectiveness of Pollution Abatement Projects is Lower than the Designed Capacity

34. The development of urban sewage treatment facilities is insufficient. The Program of the State Council on Comprehensive Work for Energy Saving and Emission Reduction requires that new urban sewage treatment plants with a total capacity of 45 million tons per day be built during the “11th Five-Year Plan” period; this level provides the capacity to reduce COD by an additional 3 million tons per year. However, the Program does not specifically require the reduction of 3 million tons of COD per year. This indicates that to turn the capacity into actual COD reductions, significant work is needed to improve the effectiveness of urban sewage treatment plants. Another issue is how to minimize facility downtime and wasted resources from ineffective environmental infrastructure, and address the issue of meeting the demands for sewage treatment (“capacity becoming reality”). The development of urban sewage treatment plants across China has accelerated since the “10th Five-Year Plan” period. However, the development of urban sewage treatment facilities lags population and economic growth due to a lack of available investment capital. At the end of 2006, 248 cities in China did not have sewage treatment plant. In at least 30 cities, more than 50 sewage treatment plants did not operate or operated at a load of less than 30%. In addition, the construction of pipelines to transport sewage significantly lagged the development of urban sewage treatment plants. This seriously hinders the effectiveness of sewage treatment facilities.

35. Disorderly market competition affects the quality of desulphurization projects. The relatively young desulphurization industry operates in an immature market with insufficient industrial standards, relevant laws and regulations, and market access, making it difficult to ensure the quality of desulphurization projects. Over the past few years, many companies with little [experience or] technology in desulphurization have entered the industry. This has led to lower prices and vicious competition. The market price of wet limestone desulphurization has been reduced to 200-300 yuan/kW, which is too low to ensure the quality and effectiveness of desulphurization projects. The technical standards of some emission reduction facilities are low and the associated monitoring system provides poor reliability and accuracy. Some projects have such a long construction period that the technology is obsolete before the projects are completed, or when the desulphurization project is finished renovation is required Equipment quality directly influences the emission removal efficiency and resulting benefits.

36. Insufficient policy measures to support long-term operation of pollution control equipment at maximum capacity. The experience of some developed countries demonstrates that the cost of operating pollution controls will become more prominent with the completion of large amount of pollution treatment facilities.

Because pollution control does not generate direct economic benefits, enterprises seldom set aside sufficient funds for the operation of pollution treatment facilities. Therefore, the government should emphasize supervision of the facilities' operations. In 2006, 24.49% of wastewater treatment enterprises lost money amounting to 148 million yuan. The sewage treatment fee in many Chinese cities is low, lower than treatment costs. This has an impact on the effective operation of sewage treatment plants.

A.9 Difficulty Synchronizing Emission Reductions and Environmental Improvement

37. There is no direct relationship between the total emission control target and environmental quality. At present, urban air and water quality of many Chinese cities does not have a direct relationship with COD discharges and SO₂ emissions. In 2006, 7% cities in China failed to meet Grade III national particulate quality standard. The emission of large amounts of NO_x leads to complex impacts on NO₂ concentrations and O₃ concentrations in the troposphere. In some waterways, pollution from non-point sources exceeds pollution from point sources. Non-point source pollution is a key factor impairing water quality. However, existing policies for the reduction of both COD and SO₂ emissions are focused on the control of point sources. In particular, SO₂ reduction aims to control acid rain pollution by mainly focusing on the power industry without considering SO₂ emissions from industrial boilers that have more impact on ambient air quality. This will influence the effectiveness of emissions reduction efforts. There are no systematic measures for the control of COD, nitrogen, and phosphorus pollution from non-point sources such as livestock and fowl farms and rural sewage.

38. Lack of systematic consideration of the ancillary costs of emission reduction projects. Present emission reduction projects involve large-scale use of desulphurization equipment in coal-fired power plants and urban sewage treatment plants. Both end-of-pipe treatment approaches have similar challenges, including the market pressure on the price of raw materials for construction and operation, accurate on-line monitoring; difficulty in ensuring the quality of emission reduction projects; market saturation of the byproducts from pollution control, and secondary pollution from the stockpile of byproducts. At present, desulphurization equipment in most power plants employs a wet-limestone approach. This approach generates 2~3 tons of gypsum for each ton of SO₂ removed. Therefore, at least 11.80 million tons of gypsum will be generated each year. If the gypsum is not used in products, it will be stockpiled, which could lead to secondary pollution as weather causes dust problems. The treatment and disposal of sludge byproduct from wastewater treatment should be an important element of COD reduction. The lack of proper disposal options for sludge byproduct will greatly reduce the net environmental benefits of COD reduction projects. There are no technical difficulties in the use of

desulphurization gypsum or the treatment of sludge; the key lies in policy support.

A.10 Environmental Management Capacity Insufficient to Meet the Emission Reduction Challenge

39. Severe lack of regulations on the control of total emissions. Total emission control, notification of pollutant discharge and emission permits are common in developed countries. Laws require enterprises and individuals to truthfully report emissions and sign their name to ensure the authenticity of every report. Relevant laws also consider perjury to be a serious crime. However, many enterprises in China have not developed a culture of truthful pollution reporting, leading to inaccurate emissions data. It has been over 10 years since China first implemented the total emissions control system. However, there are no integrated regulations on the control of total emissions or emission permits.

40. Weak foundations for the “Three Systems” and lack of supporting systems. The emission reduction work reveals weak capacity in the three big environmental systems, i.e. environmental statistics, environmental monitoring and performance examination. In the near future, it will not be easy to change the limited capacity of these environmental systems due to just initiation of these systems and the technological conditions and local supporting funds [not sure what this means]. Funds for monitoring funds have not been allocated, apart from equipment for monitoring pollution sources for enforcement purposes. There are no relevant administrative systems supporting capacity building efforts for the “three big systems”. For example, there is no strong technical support for assessing the optimal distribution of total emissions, optimal responsibilities for emission reduction measures, and effects of emission reduction. In general, the development of the database on pollution emissions and the environmental monitoring network represents a good beginning. However, there is a big gap between environmental statistics and the need for emission reductions. There are no unified examination or estimation methods for calculating emission reduction. Local authorities lack an appropriate understanding of the necessary incremental and net emission reductions of major pollutants, leading to a relatively large difference between the national estimated emission reduction data and local data.

41. Emission reduction data may not be accurate and reliable. Accurate and systematic statistical data for industrial point-sources, domestic garbage, urban emissions and rural emissions do not exist. There is no accurate database for assigning emission reduction responsibilities and tracking results. 1) Point-source monitoring has just started. The monitoring scope, frequency, and technology are quite limited; relevant policies for automatic monitoring are not in place; and there is no clear understanding of the different pollution sources. 2) Data collected by the government does not fully and accurately reflect environmental quality or emissions

at source. The database of source emission and the monitoring network need to be enhanced and the monitoring methodologies need to be consistent. 3) Existing environmental data in environmental departments is in a state of disorder. There are many sets of data, such as enterprise self-reporting, environmental impact assessments, environmental inspections and environmental monitoring. The data sets are not correlated or compatible.

42. Superficial examination of reported emission reductions. At present, some local governments play the “numbers game”, treating the binding pollution reduction targets as a statistical exercise. This can lead to a situation of “meeting” the total emissions with no control, i.e., talking more but doing less. They have not put the emphasis on the implementation of pollution reduction policies and measures, or the responsibility for quality and operational control of pollution reduction engineering projects. The Central government and local authorities are playing a game with emission reduction data; this directly affects the effectiveness of the emission reduction program. In some areas, the examination of emission reductions is still quite superficial without an assessment of the target allocation of pollution reduction and without clear targets for inspection. In most areas, local authorities adopt the “subordinates follow the example of their superiors” practice, which simply allocates the reduction task to the next level of government level. As a result, the allocation just focuses on administrative regions; the process of allocating to emission sources is not well implemented, especially for industries with large discharges of water pollutants.

43. Insufficient capacity for supervising the operation of reduction projects. The experience in developed countries demonstrates that the installation of extensive pollution control facilities raises operation costs. Enterprises in China are not willing to spend large amounts of money on pollution control facilities that provide no direct economic benefit. Because of this, supervising the operation of pollution control equipment is critically important. Issues to address include insufficient measures and capacity, inconsistent enforcement and insufficient penalties for lawbreakers. Key industrial pollution sources, especially coal-fired power plants with desulphurization equipment, do not have accurate on-line monitoring which makes it difficult to supervise and operate them effectively. This affects the long-term, stable operation of the facility. According to investigations, of 829 key industrial effluent sources under the national monitoring program in 2006, only 547 had stable discharges that met the standard.

Part B: Policy Recommendations on the Achievement of Emission Reduction Targets during the“11th Five-Year Plan” Period

B.1 Establish a Performance Examination System with Priority for Energy Saving and Emission Reduction Indicators

1. Restrict environmentally-damaging government behaviors through institutional reforms. Environmental protection involves the “damaging hand”, “control hand” and “shelter hand” [these three “hands” require explanation] of local governments. Information on emission controls is communicated primarily through speeches or documents. The root cause of many environmental pollution problems is the failure on the part of local governments to make decisions and their protectionist practices. Under China’s current financial and taxation system, many local authorities prioritize the development and growth of industries with high energy consumption and heavy pollution. This creates local financial revenues, but is counter to the energy saving and emission reduction program of the Central government. To some extent, the environment for industries with high energy consumption and heavy pollution will exist for some time. In China, the game between local authorities and Central government is not an accidental phenomenon. The impact of the export-oriented industrial structure on emission reduction should not be ignored. Only with systematic and institutional reform can China truly curb the negative impacts of economic development on the environment. With financial, tax and institutional reforms, the government can address the problem of the Central government vigorously advocating sustainable development but local governments only seeking economic growth.

2. Identify the institution responsible for emission reductions; change the current situation in which economic growth and emission reduction targets are considered separately. The social and political system of China makes it difficult for local officials to change their approach to development, and to focus on sustainable development, if the Central government does not put a greater emphasis on environmental protection and emission reduction when assessing the performance of local government leaders. At present, many local authorities still consider emission reduction targets and economic growth separately. In addition, they treat environmental protection as a “loose” standard and economic growth as a “strict” target. It should be clear that emission reduction responsibilities lie with the local government, not the local EPBs. China should improve the responsibility and examination systems. In particular, China should strengthen the fragmented oversight of industry. China should also change the situation in which upper environmental protection departments examine the performance of subordinate environmental protection departments.

3. Reduce the role of GDP growth in the performance assessment of local party and government leaders. Performance indicators for local officials should include scientific and green indicators, such as emission reductions and improved environmental quality. The primary focus should be emission reduction indicators.

GDP growth must be based on achievement of the emission reduction and energy saving targets. The practice of giving preference to GDP growth should not be allowed. In situations in which local governments do not meet energy saving and emission reduction targets, the government should take practical measures to cut economic growth. China should increase the importance of achieving emission reduction targets in performance examinations. If an emission reduction target is not met, the local officials should be assessed as “failing” regardless of whether other targets are achieved. Appropriate and practical environmental indicators should be included in the official performance examination system to avoid the superficial examination of these indicators. The binding GDP growth target should be waived for areas subject to national restrictions or development bans. Enterprises administrated by the Commission of the State-owned Assets Supervision and Administration should take the lead in carrying out the performance assessment system by prioritizing energy saving and emission reduction targets.

4. Relevant Central government departments should take the lead to reduce emissions. Based on each department’s role in emission reductions, relevant departments of the State Council are urged to take the lead to develop workable policies to support energy saving and emission reduction. This may mobilize local governments to reduce emissions and create an environment where the whole society is involved in energy saving and emission reduction. Some important government departments like NDRC should take full account of the impacts of increased productivity on the environment when evaluating industrial development plans (e.g. electricity, petrochemicals and electrolytic aluminum). They should also take the lead in implementing the Law of the People’s Republic on Environmental Impact Assessment. Financial departments should allocate 5% ~ 10% of new incremental revenues for environmental protection and emission reductions, fully implement the financial functions for environmental protection and supervise the use of funds for emission reduction. The Construction Department should integrate infrastructure, including sewage pipelines, into the reduction target and assume responsibility for reducing the COD discharge from urban sewage.

B.2 Reduce Pollution in the Whole Production System with Emphasis on its Up-stream and Mid-stream

5. Implement an integrated emission reduction strategy. The achievement of the emission reduction targets will require a shift in the mode of economic growth. Traditional development and end-of-pipe treatment cannot meet the requirements for total emission control. China should develop an integrated approach including resource and energy consumption, energy and resource savings, technological advancement, pollution control, enforcement, incentive measures and higher efficiency. China should develop an integrated system for emission reductions covering the production, consumption and disposal processes. In particular, China

should improve upstream emission reductions through structural adjustments and midstream reductions through technological improvements. Linking total emission reduction targets with socioeconomic development, China should achieve the emission reduction targets through measures such as resource and energy conservation, industrial and economic restructuring, production technology improvements and emission reduction projects. China should develop policy incentives, project management systems and inspection systems. Emission reduction efforts should focus on controlling new sources of emissions followed by the reduction of existing emissions. Reducing the emission increments upstream is more efficient than adding more end-of-pipe emission control. Therefore, the authorities should focus on the new increments first and then reduce existing emissions. Using this approach, the responsibility of local EPBs to monitor end-of-pipe and midstream emissions decreases, while reduction efficiency and environmental benefits increase. The Chinese government should draft regulations and management policies to implement this shift to upstream pollution prevention.

6. Strengthen the management of demand for resources and energy; control the unrestricted growth of resources and energy consumption; and implement “upstream” emission reductions. Achieving the 20% energy saving target is a prerequisite for achieving the emission reduction target. Based on current energy and industrial development plans, achieving the energy saving and emission reduction targets will limit industrial coal consumption (not including the power sector) during the “11th Five-Year Plan” period to an additional 170 million tons with no growth from coal-fired industrial boilers. This will be extremely difficult to achieve. Therefore, the government should control the consumption of energy and resources and emphasize “upstream” emission reductions. Enhanced management of resource and energy demand, combined with efforts to conserve energy and resources, should facilitate the overall reduction of resource and energy consumption. By utilizing the emission reduction approaches with the highest cost-benefit ratios, China could obtain multiple additional benefits aside from emission reduction.

7. Improve the quality of development, implement “midstream” emission reductions and control new and additional emissions. China should strengthen “midstream” emission reductions. Industrial enterprises must manage the whole production process; promote industrial restructuring, improve technology and “clean” production practices; raise the quality of economic development, all in an effort to optimize social and economic development. 1) Establish industrial policy and market access based on total emission control. China should revise and improve its environmental standards to control additional emissions. The government should speed up the development of emission intensity targets for key industries such as metallurgy, building materials, electricity and light industry. New development projects should be required to comply with emission intensity standards. China should develop policies to phase out specific industries and target pollution controls

in different regions. In addition, China should gradually start to focus on the performance of emission reduction equipment. 2) Enhance efforts in industrial restructuring. With the adoption of such measures as administrative interventions and market regulations, China should expand efforts to ban new construction projects at the regional and industrial levels to constrain disorganized local investment and haphazard development. Achieving GDP growth targets should not be an excuse for poor performance in resource utilization and environmental protection. China should speed up development of a list of products with high pollution and high environmental risks; track the phase-out of small thermal power generating plants with a total capacity of 40 million kW; and track the development of industrial restructuring. 3) Raise the price of energy and resources and gradually increase charges for environmental pollution to include externality costs. The pollution discharge fee should at least cover or exceed the externality costs. It should also exceed the cost of controlling emissions.

8. Take stricter local measures to curb the growth of industries with high energy consumption and high pollution. China should strengthen its supervision of financing for industries with high energy consumption and high pollution and reduce the quota for those industries. Regulations, such as permits, bans, restrictions and taxation should be more stringent to control growth in these industries. The government should enhance efforts to encourage the import and export of environmentally-friendly products through direct subsidies, tax rebates or tax exemptions. The Central government should adopt administrative measures to constrain local development of industries with high energy consumption and heavy pollution. Using land as the constraining factor, the Central government should prevent the development of these industries through stringent land-use approval requirements and streamlining punitive procedures for land use by illegal development projects. The Central government should use market mechanisms, including controlling credit and loans. Measures that create loan conditions for industries with high energy consumption and heavy pollution, establish corporate environmental reporting and accelerate changes to export policies, should limit excessive investment in, and raise the financial cost of, such industries. In addition, the Central government should make full use of the economy-wide monetary and financing policies, appropriately control the speed and direction of industrial development, ensure that economic growth targets are achieved, and avoid unhealthy development of selected industries.

9. Promote regional emission reduction through EIA. Measures requiring regional EIAs can help the Central government prevent environmental pollution and ecological damage and make more appropriate strategic decisions for industrial distribution and resource allocation. These decisions can effectively solve environmental problems resulting from concentrated or excessive levels of industries with high consumption of energy and resources, and heavy pollution but low

efficiency in specific regions. Using regional EIAs will aid government decision making and economic development by optimizing environmental protection. The Commission on the Environment and Resources of NPC should inspect the implementation of EIA and draw attention to government plans that have not carried out EIAs.

10. Establish a diagnostic mechanism for economic development and emission reduction. The Chinese Government clearly understands that environmental protection cannot be separated from social and economic development. Interactions exist among economic development, energy saving and emission reduction targets. China should set up a monitoring, analysis and early warning mechanism for the three indicators – economic development, energy saving and emission reductions – and regular assess progress. The government should also identify and publicize problems that affect emission reduction and present targeted solutions. EPBs should emphasize the review and approval of new development projects, formulate standards and policies, and coordinate environmental policies and targets with national economy-wide policies. This can aid with the coordination and practicality of the economic growth and emission reduction policies. In the near future, China should establish a short-term diagnostic platform that assesses the environmental situation including emission reduction trends, strengthens data analysis and macro forecasting and manages emission reduction efforts.

B.3 COD Reductions from Key Sectors and Industries

11. The government should assume responsibility for addressing issues related to the treatment of urban sewage, and the construction and operation of pipelines. Based on the historical experience of the United States, EU and Japan, the government at all levels should consider the construction of urban sewage treatment plants as a government priority to be supported with public financial resources. The government should not put undue emphasis on market mechanisms and ignore the government's responsibility to construct urban environmental infrastructure. The operation of the environmental infrastructure can be carried out by enterprises through gradual commercialization. Financial capital, especially from the central budget, should not be used to subsidize the operation of sewage treatment plants. But the central budget should be a key source of funding for the construction of sewage treatment plants in key river basins in the central and western part of China. The authority should also consider sludge treatment and the construction of relevant pipelines as an integrated part of sewage treatment facilities. During the review and approval of sewage treatment facilities, consideration should be given to performance (COD reductions) and the principle of pipeline infrastructure as a prerequisite. If a project does not meet the policy requirements, specific funds, such

as central financial transfer payments, could be cancelled. The Central budget funds should be considered a bonus, rather than subsidy, for the construction of sewage pipelines. These funds should be linked both to the total length of the pipeline and the treatment capacity and actual COD reduction potential. The government should examine the utilization factor of sewage treatment plants and the actual COD reductions and implement a policy of pro-active construction with greater subsidies. A comprehensive plan should be developed for the treatment and disposal of the sludge when designing sewage treatment facilities. The government should develop and improve relevant regulations and standards on the treatment and disposal of the sludge. The government should also promote the development of sludge treatment technologies, establish sludge management funds for financing the development and upgrade of equipment for treatment plants taking the initiative to collect and reuse sludge. This will aid in the promotion of the sludge recycling and reuse industry.

12. Develop emission reduction programs and measures for key industries.

According to the requirements of the Program on Comprehensive Work for Energy Saving and Emission Reduction, the Chinese government is required to facilitate the development of a comprehensive program for COD reduction, allocate COD reductions for each industry and identify detailed requirements for emission reduction of each industry. The government should accelerate the COD emission reduction program for the paper making, chemicals, textile, food and beverage industries. The government should issue comprehensive, targeted industrial policies covering technical, economic and industrial policy. Case studies show that reducing COD pollution from paper making industry should focus on the distribution of the industry, adjustment of inputs in the papermaking process, the application of new technology and more stringent emission standard. Adjusting the inputs should focus on raising the percentage of wood fiber with a significant increase in the proportion of waste paper and a decrease in non-wood fiber. In other relevant industries, such as food and beverages, measures like water conservation and pollution reduction should be promoted. Learning from the experience of EU and the United States, China should publish instruction manuals for emission reductions for each industry. According to the requirements of the Program on Comprehensive Work for Energy Saving and Emission Reduction, the government should urge local authorities to publicize enterprises that are required to phase out outdated production processes and link the program to the policy of restricting new development projects and the review of new construction projects.

13. Improve the emission standard for industries with higher compliance rates. China should encourage local governments to implement industrial emission standards that are more stringent than national minimum standards, especially in eastern China where pollution is heavy and the economy is well developed. Based on international experience, China should develop national emission standards using the best available technology and establish a system to review and revise industrial

standards Priority should be given to revising the emission standard for the paper making industry. If China modifies existing National Standards for the Discharge of Water Pollutants of Paper Making Industry (GB 3544 – 2001) - COD < 55 kilograms per ton of wood pulp and COD < 160 kg/t of grass pulp (applying internal state-of-the-art technology) - it is expected that COD emissions will be 541,000 tons in 2010 assuming 35% growth. (The China Paper Making Association estimates paper output will reach 76 million tons in 2010). This would amount to total COD reduction of 1.06 million tons, accounting for 66% of COD discharges. In addition, China should strengthen the exchange of technical information and technology transfer and enhance research and development. It should strengthen enforcement, establish an implementation system that combines emission standards with permits, improve enforcement, and increase penalties for non-compliance. It should approve the implementation of the 11th Five-Year National Plan for the Prevention and Control of Water Pollution of Key River Basins as soon as possible. Furthermore, China should encourage tertiary treatment of the treated wastewater from secondary wastewater treatment plants and require that the outlet water of urban sewage treatment plants in key river basins or sensitive regions meet the Grade A national surface water quality standard.

14. Develop economic policies to support the reuse of treated urban wastewater. The Chinese government should encourage the expanded use of treated wastewater. It should develop principles and guidelines for the recycling and reuse of wastewater, instruct local governments to plan, construct, and manage waste water recycling and reuse facilities as well as develop technologies to facilitate sustainable use and conservation of urban water resources. China should invest more in projects that recycle and reuse urban sewage and provide preferential policies, such as credits, taxes and resource prices, that encourage enterprises or industries that reuse treated water. Also, it should develop compensation mechanisms and price incentives to promote the substitution of natural water with treated water. Preferential pricing policies can encourage the use of treated water, providing a win-win solution for energy saving and emission reduction. China should take measures to improve the use of treated water by large water consumers and require its use by select industries.

B.4 Systematic SO₂ Emission Reduction

15. Systematically reduce SO₂ emissions in the life-cycle of coal. Based on the experience of the EU, United States and China, cutting SO₂ emissions must be a long-term task. The government should change its focus from end-of-pipe desulphurization equipment. A comprehensive cost-benefit analysis of control options can facilitate SO₂ emission reduction efforts by assessing the entire lifecycle of coal, from mining through combustion. The government should make efforts to

adjust the structure of coal production by tightening the high-sulphur coal limit from 3% to 2.5% or 2% and developing programs to encourage the utilization of low-sulphur, high-quality coal. The government should use energy-saving and emission-reduction funds to support coal washing and utilization of such coal; enhance quality of coals used by small- and medium-sized consumers; raise design standards for industrial boilers with higher combustion efficiency and optimize the energy mix. In addition, the government should enhance the monitoring and inspection of desulphurization projects, focus on pollution control for coal-fired industrial boilers, and make more efforts to use gypsum byproduct to avoid secondary pollution.

16. Increase the use of washed coal. China should, according to existing law, require new coal mines to establish coal washing facilities; streamline small coal mines and shut down small coal washing facilities with low efficiency and heavy pollution. The government should restrict the construction of new coal washing plants with capacities less than 300,000 tons per year. China should also establish funds for coal washing, enhance the development and introduction of coal washing technology, address reliability and efficiency issues of domestically-produced washing equipment and improve the design and management of coal washing technologies. China should establish policies to aid in the appropriate distribution of washed coal. Priority for the use of high-quality coal should be given to large cities and residential areas. High-sulphur coal should be restricted to power plants with desulphurization facilities. The government should take measures to promote the utilization of coal gangue and acid manufacturing to facilitate the sustainability of coal washing. The government should also develop coal price categories based on the type, grade and quality of coal with the price of coking coal based on the ash percentage and power generation coal based on the heat value. The government should lower the transportation cost of washed coal to encourage more utilization of washed coal.

17. Implement policy measures for desulphurization at thermal power plants. It is appropriate to focus on the power industry for SO₂ emission reductions during the 11th Five-Year Plan period; though this does pose some risks. The government should closely monitor implementation of the plan. The government should fully implement the existing policy that power plants with desulphurization facilities receive a higher price for electricity and that the power grid shares the cost. New and expanded coal-fired power plants must construct desulphurization facilities in accordance with environmental regulations. These plants are encouraged not to construct flue gas bypass pipes. Coal-fired power plants should maintain records of the operation of their desulphurization facilities, including operation and maintenance, continuous monitoring data, generation load, coal sulfur analysis, limestone consumption, power consumption, disposal of desulphurization byproducts, use of bypass pipes and accidents and relevant responses. These records

should be subject to inspection by relevant authorities. When coal-fired power plants install desulphurization facilities, automatic on-line monitoring system must be installed and the real-time monitoring data should be submitted to EPBs and the power grid authority.

18. Develop policies for comprehensive utilization of the byproduct gypsum.

The government should develop policies that encourage the use of desulphurization gypsum in products. This will reduce the need to mine natural gypsum. The government should also expand the market for products, implement preferential policies on comprehensive utilization of resources, and reduce or exempt the value added tax for enterprises that use desulphurization gypsum. The government should also intensify enforcement efforts to ensure the normal operation of desulphurization equipment at power plants and consistent supply of raw materials for enterprises that utilize byproduct gypsum. The government should encourage efforts to develop technologies combining desulphurization and sulphur extraction. In doing so, the problem of large stockpiles of desulphurization gypsum and the import of sulphur for acids can be reduced.

19. Improve the operation of desulphurization facilities at power plants.

At present, most coal-fired power plants use the wet-limestone method to remove sulphur. Although this method is reliable and provides high removal rates, it is unlikely that Chinese desulphurization equipment manufacturers developed the necessary experience in this field in less than 5 years. The government should develop national specifications on the design of desulphurization projects in coal-fired power plants as soon as possible, formulate engineering and construction standards and strengthen the supervision of franchised equipment manufacturers. This may help avoid the scenario of recently completed desulphurization facilities being deemed ineffective and in need of reconstruction.

B.5 Central Government Should Exert Authority in Emission Reduction Through Financial Power

20. The central government should take the lead to exert “authority based on financial power” for emission reduction. At present, there is a gap between the central and local government financial and tax systems and environmental policy implementation. It is recommended that the central government exercise authority on emission reduction to a level consistent with its financial power. The experience of the United States and Japan are examples where the Central government exerts authority through dedication of national level staff and specified approval procedures for special plans and programs. In view of the urgency and long-term nature of emission reduction, it is recommended that China learn from the American practice of helping to finance the construction of urban sewage and garbage treatment facilities by the federal government. Specifically, the central

government should increase the budget in sectors where environmental protection is a priority, develop more proactive national policies on investment in environmental protection infrastructure, and dedicate 5%~10% of any new financial revenue increments to environmental protection. Financial transfers from the Central Government should include environmental protection considerations. China should establish budgetary funds for emission reduction environmental infrastructure similar to the Japanese Environmental Group financing procedures, or create revolving funds for sewage treatment as in the United States. During the “11th Five-Year Plan” period, environmental infrastructure investment in 10 key projects is estimated to require 150 billion yuan from the central budget. This is equivalent to 30—40 billion yuan annually. This investment represents about 10% of total environmental investment. The Chinese government should support these investments as soon as possible.

21. Local governments should assume their responsibilities and make more efforts in emission reduction. China should amend the Environmental Protection Law. First, the guiding role of the government for environmental investment should be specified, and a base line for financial investment established. Second, identify the proportion of environmental funding within any financial budget growth in order to ensure adequate support for “211” projects and sufficient funds to meet the emission reduction target. At the same time, the Chinese government should develop and adopt statistical methods for measuring pollution abatement and control expenditures in keeping with international practices. According to methodologies used by OECD and Eurostat, investment in green and garden areas as well as construction of natural gas heating infrastructure with indirect environmental benefits, should no longer be classified as environmental investments.

22. Develop and issue an investment and financing policy for corporate pollution management under a new financial and taxation system. The existing policies on the 9 financing channels for enterprise environmental protection, issued by the central government in 1984, should be reformed as soon as possible. China should study and issue an environmental investment policy under the new financial and taxation system. Various financing channels should be assessed and mechanisms for raising funds for pollution control identified. Enterprise expenditures for environmental protection equipment, energy savings or emission reduction should be tax-deductible. The income tax resulting from the sale/application of new state-of-the-art environmental protection equipment, reformed technology investment and adjustment of industrial processes, could be reduced by a certain amount or exempted completely. The government should apply preferential policies for corporate pollution control projects in terms of loans, interest rates, and loan repayment conditions. It should also accelerate the pace of policy development regarding land use, the price of energy for pollution treatment projects, and accelerated depreciation.

B.6 Strengthen Enforcement and the Capacity of Environmental Authorities to Ensure Facilities Play their Role in Emission Reduction

23. Enhance the legislative and coordination mechanisms for emission reduction. The government should issue Regulations on the Control of Total Emissions of Major Pollutants, as soon as possible, in order to provide a legal basis for emission reduction. Focusing on emission reduction, the government should enhance and integrate environmental management practices including streamlining assessments and approvals, licensing, environmental impact assessment and timely inspection and decision-making upon project construction completion. In areas, where appropriate, the government should implement pilot projects to implement independent and vertical management of environmental monitoring and enforcement in order to control the poor environmental behavior of local governments. Learning from the Japanese experience, the government should establish a factory on-site environmental supervisor system, under the dual leadership of the enterprise and local EPB. Professional certification programs should be developed for environmental monitors and supervisors. The government should carry out a trial regular inspection and environmental performance reporting system with key polluting enterprises. As in Canada, the government should identify relevant enterprises in three categories: up-to-the-standard, subject to risk management and advanced, with corresponding administration methods. China should strengthen national enforcement functions and tools while enhancing the independence of local EPBs in decision making and implementation. The local EPB's capacity to participate in comprehensive policy making should also be enhanced. The government should beef-up the development of an effective environmental law enforcement system and standardize law enforcement down to the prefecture and county levels. In addition, it should amend the components of relevant laws & regulations that are vague in identifying legal responsibilities. An aggressive enforcement campaign should be initiated. Punishment for environmental infringements should be raised to a level where any advantage to pollute is removed.

24. Strictly supervise the operation of on-line monitoring equipment to ensure effective operation of pollution treatment facilities. The government should supervise monitoring facilities in order to facilitate their smooth operation. It should strengthen the management of on-line monitoring equipment, establish & improve the specifications for on-line monitoring in terms of testing, checking, acceptance, networking and data use. It should specify the legal validity of on-line monitoring data. In addition, China should raise the quality standards for on-line equipment, further streamline the market for introducing on-line monitoring products, develop a regulatory framework for the commercial operation of on-line monitoring equipment, and promote third party verification. The government should promote the introduction, operation and networking of on-line monitoring

equipment into the process of managing sewage treatment plants and coal-fueled power plants. In addition, it should accelerate the implementation of a national plan to build capacity for environmental enforcement and compliance and put in place the finance necessary to implement the plan. It should enhance the capacity of regional environmental protection supervisory centers to enforce emission reduction according to the law.

25. Facilitate the sharing of information about emission reduction and enhance public participation. China should speed up the establishment of a database on the emissions of major pollution sources, under a national control program. This database would make public information about the emissions and reduction strategies of specific polluting industries and enterprises across China. It should document case studies that encourage local government to make public information about emission reduction by key enterprises and their progress in meeting total emission control targets. China should adopt more “mixed” policy measures such as CACs, MBIs and VA tools. Learning from the experience of OECD countries where there is a “mixing and matching” of individual environmental policies for achieving optimal outcomes, China should integrate various policy instruments to address the problems during the pollution life cycle. It should verify emission reduction outcomes by qualified third-parties and enhance public participation in the review of results. China should facilitate public involvement in all aspects, including decision making, supervision and management of emission reduction initiatives. Public awareness in emission reduction will promote the sustainability of emission reduction.

26. Strengthen the integration and dynamic management of emission reduction data. The government should strengthen and better integrate emission reduction data to provide a better basis for environmental management. China should establish the basic capacity to analyse background and baseline emission levels, and emission reductions. Efforts should be made to set up an accurate, comprehensive database of key pollution source emissions. Based on monitoring, enforcement, emissions and EIA data, a scientific check could be conducted on the data collected for key, national pollution sources. Through sample monitoring, the central government could directly control this data to ensure accuracy and avoid possible interference. It should strengthen the implementation of emission reduction projects, while analyzing the dynamic relationship between reductions in emissions from old pollution sources and incremental increase from new sources. It should combine the administration of emission permits, with point source quantitative management and appropriately assess emission reduction for each source. The “three data forms” - emission fees, environmental statistics, and emissions notification - should be reconciled.

B.7 Accelerate the Establishment of Long-term Policy Measures for Emission Reduction

27. Further promote reforms of the pricing & taxation of resources and environment. Prices should integrate the full environmental costs of water and coal resources usage. Using the pricing lever, China should establish and implement the environmental pricing mechanism where the “polluters pays”. Following the example of differentiated price for power generated from facilities with desulphurization capacity, a differentiated electricity & water price policy should be adopted for heavy polluting industries such as pharmaceuticals, chemicals and paper making. The government should raise the emission discharge standard, expand the range of environmental charges and increase fee collection efforts. The current SO₂ emission charge of 0.63 yuan/kg should be raised to 1.26 yuan/kg, so that the charge covers the treatment cost. It is also recommended that the government should raise the current sewage treatment and COD discharge fees of key river basins and regions to over 0.80 yuan/t and 1.20 yuan/kg respectively by the end of 2008. In addition, products made with heavy pollution and high energy consumption should also be taxed at the consumer level. The resource tax rate for coal, petroleum and natural gas should be raised.

28. Introduce incentivess to support emission reduction. The State should continue to provide incentives for power plants with desulphurization equipment. The government should assess energy saving in relation to electricity generation. The government should further implement preferential policies for power generated desulphurization units. It should give economic compensation to enterprises that shut down or experience reduced productivity because of environmental measures. It should establish a database on the environmental performance of key polluting enterprises and strengthen information exchange about environmental protection measures. Tax, bank policies and loans should reward environmental performance enhancing initiatives. The government should award and commend in an appropriate way those enterprises that achieve the emission reduction task ahead of time, or have a good environmental performance. It should establish a reward fund for total emission reduction results, and openly recognize those enterprises or local governments contributing to emission reduction. It should adjust the loan structure for a region where the cumulative impact of new development projects is a concern.. Also, it should cancel the preferential taxation policy and reduce any subsidies to those enterprises that have not met their emission reduction targets, or continue to discharge pollutants against the law. China should learn from the American experience, and actively implement pilot projects on tradable permits. If the trial is successful, emissions quota and tradable rights should be extended to enable enterprises to benefit from emission reduction. The development of a power market system should consider an emission reduction requirement. The government should extend the power generation license system, power generation tradable rights and

green power quota trade. That is, it should adopt market-based approaches to promote the shut-down of small thermal generation plants, which would result in energy savings and emission reduction.

29. Advocate green consumption and promote emissions reduction in all of society. Learning from the new “Energy Policy Act” of the United States, China should adopt incentive measures such as reduction (exemption) of tax and direct consumer subsidies for energy saving and emission reduction products. This will encourage the whole society to participate in energy saving and emission reduction activities. Government should make more efforts in the procurement of green products, energy saving in buildings, water conservation and emission reductions at their facilities.

Part C: Strategic Outlook on Emission Reduction for the “12th Five-Year Plan” Period

It is expected that by 2020 China will achieve the goal of a Xiaokang (well off) Society in an all round way, with economic development reaching the world average. This is the second-stage objective of the “three stage” strategy of China. Environmental protection has become an important component for the development of the Xiaokang Society in an all round way. Therefore, environmental protection and the selection of an effective emission reduction strategy during the “12th Five-Year Plan” period is of vital importance.

C.1 Emission Reduction is Still the Long-term Task for Environmental Protection

1. Implementing total emission control in China will be significant before 2020. It is expected that the consumption of energy and resources in China will peak by 2020. In 2020—2030, it is expected that environmental pressures will gradually decrease due to technological advancements and the transformation of China’s economic structure and consumption patterns. The relationship between economic growth and consumption of raw materials will ease with a consequent decline in the emission of major pollutants. By the year 2050, when China realizes a development level equal to intermediate developed countries, it is expected that environmental problems may be addressed in “an all round way”. However, before the decrease of pressure on resources, energy, population and industrialization, China will experience pressure from social and economic development resulting from environmental concerns. Total, cumulative emission reduction will be a long-term, onerous and complex task.

2. Emission reduction will become more difficult during the “12th Five-Year Plan” period. With the completion of initial emission reduction projects during the “11th Five-Year Plan” period, it is expected that further emission reductions across China during the “12th Five-Year Plan” period will be a bigger challenge. Identifying emission reduction strategies requires more consideration of proactive, technical and economic feasibility issues to ensure rational decision making. Local governments should be given guidance for the total control of such major pollutants such as ammonia, nitrogen and NOx. Environmental quality should be integrated into the local government performance assessment system. In doing so, it sends a clear message to enterprises about emission reduction through the linkage of emission reduction with environmental quality.

3. Promote the “five shifts” in emission reduction. It is recommended that CCICED establish a new TF to develop a strategy for emission reduction during the

“12th Five-Year Plan”. This TF should start in 2008 to support the long-term emission reduction strategy of the Chinese Government. The emission reduction strategy during the “12th Five-Year Plan” period should reflect shifts in the following 5 aspects: 1) shift from an exclusive focus on reduction of total emissions to one that combines total emission reduction with an improvement in environmental quality; 2) shift from an over-dependence on the reduction of emissions from key industries to a reduction of emissions from all industries; 3) shift from the total control of single pollutants to the coordinated control of many pollutants; 4) shift from increasing the number of emission reduction projects to improving their quality and achieving real environmental outcomes; 5) shift from depending on administrative intervention into utilization of long-term tools that have rational economic cost-effect ratio.

4. Pollution control is not total emission control. When promoting total emission control and emission reduction, care must be taken to not assume that pollution control is total emission control, and that the problem will be solved as long as total emission control is implemented. As a system, total emission control has its conditions and prerequisites. Pollutants suitable for national total emission control must meet the following conditions: (1) regional pollutants rather than local; (2) measurable, checkable and could be included in statistics with certain foundation; (3) primary pollutant, preferably not a mixed, composite pollutant; (4) options available for emission reduction are controllable in terms of technological and economic aspects. Therefore, the pollutants suitable for total emission control at national level are rather limited.

C.2 Strengthen Implementation of Total Emission Control

5. Actively facilitate the application of more legal and scientific approaches for total emission control. Through legal amendments, the government should shift from existing total emission control to environmental quality control with supporting legal responsibilities, including the development of more laws and regulations. Regional differences should be considered when identifying total emission targets, that are related to the environmental capacity. The government should study national strategy on total emission control based on environmental capacity. Using a scientific basis, coordination of regional development and industrial development could be handled more appropriately, minimizing fragmentation and achieving the total emission target. The government should further focus on the examination of emission intensity (pollutant emission per unit GDP), and transfer relevant experience across the country. It should provide leadership, and promote the shift in development while facilitating technical progress. At the same time, it is possible for some local areas with available environmental carrying capacity and good environmental quality to experience an increase in total emissions compared with that of 2010. This reflects an administrative flexibility to deal with different regions or industries. Generally, however, emission intensity must continue to decline.

6. Implement a targeted system for total emission control and improvement in environmental quality. The improvement of local environmental quality should be taken into account when examining the performance in emission reduction. The government should gradually promote achieving the targets for both total emission control and improving environmental quality. It should improve its capacity in the identification and comprehensive analysis of result-based data. Total emission reduction targets need to be linked to other environmental performance indicators and supported by monitoring and enforcement. In doing so, all indicators will form part of an integrated system that facilitates the achievement of national environmental policy objectives.

7. Strengthen the workability of total emission control target at local level. National government will continue to set the base control targets for the country. Local governments should be encouraged to adopt their own total emission reduction targets that address special, local conditions. The government should take bottom-up, total emission control plans as the foundation for national total emission reduction work. It should promote the implementation of **LEAP and SIP**[what are these?] initiatives that involve the participation of all local stakeholders. Government should encourage the identification of reduction options with more rationality and innovation in the decision making process. In addition, the government should develop alternative emission reduction options, creating competition among options in order to lower the cost of emission reduction. In doing so, it will shift from a binding management mode to a sustainable mode.

8. Implement demonstration projects to control several pollutants at the same time. The benefits of controlling several pollutants from a source is higher than that of single pollutant control. Experience has shown that the control of a pollutant could lead to an incremental increase in pollution in another medium- just a transfer of the problem. A trade program taking into account more than one pollutant may stimulate polluters to seek a comprehensive, lower-cost emission reduction solution. Because of the dominance of coal in the energy mix, and the emission of several pollutants from such plants, demonstration projects to exploit synergies in the control of SO₂, NO_x, Hg and CO₂ should be carried out. Coal-fueled power plants in well-developed regions should be the focus of these demonstration projects during the “12th Five-Year Plan” period.

C.3 Change the ways of reducing SO₂ Emissions

9. Start desulfurization in coal-fueled industrial boilers. The large amounts of coal-fueled industrial boilers across China causing heavy local pollution should be the focus of emission reduction during the “12th Five-Year Plan” It is expected that total demand for primary energy in China will reach 3.2 billion t coal equivalent by 2015. The installed capacity will reach 1.05 billion kW, and coal-fueled power

plants will be 840 million kW (620 million kW in 2010). Consequently, coal consumption of power plants will increase by 477 million t coal over that of 2010. With the assumption that the coal sulfur release rate is 0.9, and the sulfur removal rate 0.81, it is expected that coal-fueled power plants will emit 1.6 million t more SO₂ by 2015. This increase must be compensated by a reduction of other pollution sources. Total SO₂ emission from coal-fueled industrial boilers during the “11th Five-Year Plan” period was 6~7 million t. If there is no reduction requirement for coal-fueled industrial boilers during this period, it is expected that these boilers will emit 10 million t more SO₂ by 2015. Therefore, total SO₂ emission control targets must include coal-fueled industrial boilers during the “12th Five-Year Plan” period. Coal fueled industrial boilers, in particular the small capacity coal fueled industrial boilers, should use clean fuel. Measures such as coal washing, processing, shaping, gasification and liquidization should be utilized to further enhance clean combustion. China should develop preferential policies on providing “good quality coal” to coal fueled industrial boilers, develop a more stringent emission standard for such industrial boilers, adopt a more stringent emission standard for the design and manufacture of coal fueled boilers in order to improve their performance.

C.4 Develop New Indicators for Total Emission Control

10. Implement total NO_x emission control in thermal power industry. The power industry is the most significant sector for NO_x emissions accounting for 5.632 million t, or 35% of the national total. It is expected that NO_x emissions will increase by 2.5 million t by the end of 2010. NO_x from thermal plants is emitted from high chimneys, and consequently can move to distant areas, contributing to regional acid rain. By increasing the combustion temperature, and concentrating flue emissions, it is relatively easy to install NO_x pollution treatment equipment for boilers in power plants. This has been shown to be the most effective way to curb NO_x emissions from this source. At present, there are many mature, low NO_x combustion technologies available in the world. In addition, the experience of developed countries such as the United States, Germany and Japan in the control of NO_x emission shows successful NO_x reduction experience at thermal power plants. Based on this experience, the focus of NO_x emission control in China should be coal-fueled power plants. Specific recommendations include: (1) China should establish NO_x emission monitoring and statistical analysis methods for the thermal power industry by the end of 2010. (2) revise and issue new NO_x emission limits for thermal power plants. To effectively control NO_x emission of thermal power plants, it is necessary to implement new and more stringent emission limits for thermal power plants in 2012. By meeting the emission limit of less than 200mg/m³ for new power plants, and phasing out old plants that do not meet the standard, NO_x emissions from thermal power plants in China will not continuously increase after 2020(3) Carry out demonstration projects on nitrogen removal of coal-fueled boilers in sensitive areas. Relevant national departments should actively organize resources

to conduct relevant research on flue de-nitrification technologies, including introduction of foreign technologies. Also carry out trial work on flue de-nitrification devices such as SCR and SNCR and combined desulfurization and de-nitrification technology for boilers of power plants in key cities (including those in the Beijing-Tianjin-Tangshan region, the Pearl River delta and Yangtze River delta) to facilitate the development of a domestic flue de-nitrification industry. (4) Actively promote the extension and application of advanced clean coal technology. More efforts should be made to develop clean coal combustion technology, including the demonstration and commercialization of advanced clean-coal power generation technologies such as CFBC, PFBC and IGCC. (5) Develop and implement a unified NO_x control plan with supporting policies. It is recommended that relevant departments should work out a unified NO_x control plan and schedule as soon as possible. Economic policies encouraging emission reduction should be adopted. The NO_x emission charge rate should be raised and the on-grid price of electricity from production plants with de-nitrification facilities should be given a differential rate. (6) Adjust and optimize the geographical distribution of thermal power. Most coal-fueled power plants in China are located in the central and eastern parts of China. These areas are heavily populated, have fast economic growth, are high in their pollution load, but relatively weak in buffering ability for acid precipitation. New power plant construction should take into account the existing carrying capacity of these developed regions. In addition, NO_x emissions from the transportation sector has exceeded 30% of the total national emissions and this figure is expected to continue to rise. It is recommended that all light vehicles implement Euro VI emission standard during the “12th Five-Year Plan” period in order to address NO_x from these sources..

11. Choose key river basins and lakes to carry out total ammonia/nitrogen control. The total emission control targets for water pollutants during the “10th Five-Year Plan” period mainly focused on COD. Other pollution indicators like ammonia and nitrogen were included in the total emission control list but not as binding targets. However, the No.1 pollutant of many waters in China now is ammonia/nitrogen. China is currently carrying out a national investigation on pollution sources, and it is expected that ammonia/ nitrogen discharges will be better understood by the end of the “11th Five-Year Plan” period. It is recommended that the Chinese government include, on a priority basis, the ammonia/nitrogen level into the total emission control and performance assessment system of the “12th Five-Year Plan.” This will enhance efforts to reduce this pollutant. It is also recommended that all new, reformed, expanded and built urban sewage treatment facilities within key river basins and regions finish the construction and upgrading of nitrogen & phosphorus removal facilities as soon as possible. This will enhance the comprehensive treatment of effluents from key industries that discharge nitrogen & phosphorus pollutants.

12. Carry out trial work on the control of total nitrogen and phosphorus levels in some sensitive lakes and reservoirs. International experience in the control of total nitrogen and phosphorus shows that it is a long-term and arduous process. Experience has shown that it is more difficult to control than COD. The sources of TN and TP pollutants are complex and most of them come from non-point sources. At present, China does not have the scientific & technological information to implement basic management practices for total nitrogen and phosphorous emission control. It is recommended that China carry out trial work on the control of total nitrogen and phosphorus concentration in sensitive lakes and reservoirs. Such trials should include the control of total nitrogen and phosphorus contaminants from inflowing rivers. According to nitrogen and phosphorus control mechanisms, lakes or reservoirs like Erhai lake could be selected to carry out basic investigations. Work could be started in 2009 to understand the baseline situation, trial the total emission control and establish relevant demonstration sites.

C.5 Gradually Expand the Scope of COD Reduction

13. Assess alternative methods for controlling non-point emissions in some areas. According to the bottom-up philosophy, efforts should be made to carry out trial work on the control of non-point sources in selected areas. The purpose should be to investigate alternative approaches and understand baseline conditions. The authorities should develop monitoring and statistical methods that focus on typical industries (e.g. livestock and fowl breeding) in the trial areas. China should establish a national, non-point, COD pollution reduction strategic system, including systematic rural environment management plans. EIA procedures should be revised to accommodate non-point pollutants. Successful international experience in the control of non-point pollution by organic and chemical fertilizers, as well as pesticides, should be investigated. This will be an important area for China in emission reduction work. China should strive to gradually mainstream the control of non-point pollution into the total emission control programs in the future.

C.6 Actively Pay Attention to Emerging Environmental Issues

14. Put new pollution problems on the agenda. Certain prerequisites must be met to carry out a total emission control program. Strengthened environmental control does not necessarily fully depend upon the implementation of total emission control. Special attention should be paid to emerging pollutants of interest in the Chinese environment, including mercury, POPs, greenhouse gases and VOC during the “12th Five-Year Plan”. With proactive prevention and control measures, the government will be able to create fundamental conditions for the implementation of total control of the above pollutants at a specified future date.

