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# Climate Public Expenditure and Institutional Review: A Study of Hebei Province, China



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### Preface

Climate change issues have become increasingly serious, and tackling climate change is a task faced by the international community. China has been adopting an ecological civilization construction strategy and has actively participated in the global movement to combat climate change and promote sustainable development. In 2016, the Chinese Academy of Fiscal Sciences (CAFS) undertook the second phase of its Climate Public Expenditure and Institutional Review (CPEIR). This project, as of CAFS's completion of the first phase from 2014 to 2015, is also funded by the United Nations Development Program (UNDP). In the first phase, CAFS experts established a statistical methodology for China's climate public finance, and made a statistical analysis of the climate public expenditure incurred directly by the central government. The research achievements are highly recognized by the relevant institutions of the United Nations, the relevant divisions of Ministry of Finance and the National Development and Reform Commission (NDRC). The second phase will be advanced in depth, and will prioritize China's climate public expenditure and institutional review at the local level. By using case studies, experts will launch the provincial climate public expenditure and institutional review and explore the climate expenditure cost-benefit analysis approach.

CAFS is responsible for this research project and attaches great importance to the study of climate public expenditure. It has set up a research group headed by Liu Shangxi, Director General (DG) of CAFS, who has been selected as a member of the third National Climate Change Expert Committee (NCCEC). Gao Zhili, DG, Yao Shaoxue, Deputy Director General (DDG), Li Jiegang, DDG, Liu Qisheng, Director and Zhang Shuo, Associate Researcher of the Department of Finance in Hebei are invited as experts. The tasks of this project were preliminarily clarified in July 2016. Specifically, Hebei will be taken as the sample in the provincial CPEIR, and typical overcapacity reduction cases will be used in the cost-benefit analysis. In the course of the project, the project team conducted in-depth literature review and data collection, held a project kick-off meeting, went to Hebei two times to conduct intensive surveys, and regularly held discussions with UNDP and other international experts.

On October 10, 2016, the project team held a "Provincial Climate Public Expenditure and Institutional Review" kick-off meeting in Shijiazhuang City, Hebei. Among those present were experts from the Department of Finance (DOF), Department of Water Resources (DWR), Department of Forestry (DF), Health and Family Planning Commission (HFPC), Department of Environmental Protection (DEP), Development and Reform Commission (DRC), Department of Industry and Information Technology (DIIT), Department of Agriculture (DOA), Bureau of Meteorology (BOM) of Hebei, experts from the CAFS research group, officials from UNDP China. Liu Shangxi ,DG of CAFS and research project leader, Yao Shaoxue, DDG of the DOF of Hebei, and Dr. Zheng Yuan, Economist UNDP China, addressed the meeting. Researcher Shi Yinghua introduced the research group to the audience. The experts present shared their views and opinions.

Liu Shangxi pointed out that the project is to assess fiscal expenditure's impact on mitigation and adaptation to climate change. Climate public expenditure is vital to the optimization of the fiscal expenditure structure. Expenditure is optimized only when it is evolving in favor of mitigation and adaptation to climate change. Climate change has a great impact on the survival and development of mankind and research in this regard is of great value. China is obliged to explore a new path to deal with climate change. This is what China should do as a major responsible country. If the research is carried out on a national scale, the workload will be heavy. Hebei Province, as an important member in the Beijing-Tianjin-Hebei region, is bold to be carrying out system reform and holds a leading position in combating climate change. Therefore, taking Hebei as the example in our research will help generate larger-scale effects. UNDP has extended great support to this project and deems it reasonable to target Hebei as a case study. This study is going to sum up experience from the concept, policy and institutional mechanism perspectives. Experts should not be content with existing practices, but need to continuously learn from emerging cases to thereby build up a model for developing countries.

At the first research seminar, the project team exchanged views with experts from authorities directly under provincial jurisdiction, including the DWR, DOF, HFPC, DEP, DRC, DIIT, DOA and BOM, and held in-depth discussions on climate public expenditure and budget systems with experts from the functional divisions of the DOF of Hebei, including the Bureau of Management and Budget, Economic Construction Division, Division of Resource Conservation and Environmental Protection, Agriculture Division, General Office, Taxation Policy Division, Social Security Division, Public-Private-Partnership Office, Procurement Office, and Scientific Research Center.

Given that overcapacity reduction has been one of the important initiatives taken by Hebei to curb climate change in recent years, the project team used some overcapacity reduction cases in Hebei for research. From April 24 to 26, 2017, the project team, led by DG Liu Shangxi, went to Hebei for case research related to climate public expenditure cost-benefit analysis; Li Jiegang, deputy chief of the DOF of Hebei, provided guidance throughout the whole process. During the investigation, the project team had heated discussions with leaders and experts from the DRC, DOF, DIIT, DEP, DHRSS, and other authorities directly under the jurisdiction of Hebei; the provincial industrial associations, including the Metallurgical Association and the Coal Association; the BIIT of Shijiazhuang City and its subordinate Pingshan County; DRC, BOF, BIIT, BHRSS, BEP and other authorities directly under jurisdiction of Fengnan District; the team also visited a cement enterprise in Pingshan County, Tangshan Iron & Steel Group Co., Ltd. the largest subsidiaries of HBIS Group Co., Ltd., and Bainite Steel Group Co., Ltd., to explore the status quo of overcapacity reduction in Hebei, and the benefits, the challenges and problems thereof.

From September 5 to 9, 2016, the team members, including Shi Yinghua, Researcher and Director of the Macroeconomic Research Center, CAFS, Zhang Shuo, Associate Researcher from the Hebei research institute of Fiscal Science, and Dr. Zheng Yuan, Economist UNDP China went to Pakistan for a bilateral exchange meeting, "Integrating Climate Change Finance in Planning and Budgeting Systems". During their stay in Pakistan, the project team held discussions with

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Pakistan's top think tank, Leadership for Environment and Development (LEAD), on CPEIR, involving its goals, elements, methods, data acquisition, measurement index and time sensitivity, and met with Mr. Pated Ghazanfar Abbas Jilani, Assistant Minister of the Ministry of Finance of Pakistan, to learn about the progress of the government's CPEIR application, and Ms. Sujala Pant, Senior Advisor, Bangkok Regional Hub, UNDP Asia Pacific Regional Centre. The team also visited the UNDP Pakistan, Ministry of Climate Change, General Accounting Department, Department of International Development of Pakistan, and participated in the CPEIR kick-off meeting held by LEAD in Lahore, Punjab. This bilateral exchange would help to deepen the understanding and consensus on the CPEIR-related approaches, the application of cost-effectiveness and in climate expenditure, thereby accelerating the progress of China's climate public expenditure review.

The research has yielded good results. Team members have been invited to the relevant climate change public expenditure policy research and consultation workshops as experts. On September 30, 2016, the project leader Liu Shangxi, a member of the 3rd NCCEC, participated in the inaugurating meeting and the first working meeting of the 3rd NCCEC. The project team has completed two research reports, namely, "China's Provincial Climate Public Expenditure and Institutional Review - Taking Hebei as an Example", and "Cost-Benefit Analysis of Climate Public Expenditure Project - Taking Hebei's Overcapacity Reduction Cases as an Example". Investigation achievements such as "Overcapacity Reduction is not the Ultimate Goal" and "Further Analysis of the Relation Between Overcapacity Reduction and Cost Reduction, De-leveraging and Increased Profits" have been submitted to the relevant government decision-making authorities in the form of briefing and special reports, and have received lot of attention from Xiao Jie, Minister of Finance.

During the investigation period, the project team received strong support and guidance from the authorities, industry associations, enterprises of Hebei. Leaders and experts of the DOF of Hebei also have made valuable contributions. The project team would like to thank the authorities and industry associations of Hebei, the Bureau of Industry and Information Technology of Shijiazhuang City and its subordinate Pingshan County, and the authorities of Tangshan City and their subordinate Fengnan District. The project team also would like to thank the enterprises involved in the field visits. Further, the support and guidance from the UNDP experts Niels Knudsen and Carsten Germer were indispensable for the achievements. Many thanks also go to UNDP's research assistants Wei Li and Andrew Cheng for their significant contribution to the project.

Climate public expenditure review is an emerging field. The statistical caliber and scope of climate public expenditure has not yet been defined, and the evaluation method remains to be improved. That's why climate public expenditure review is challenging. Though the study is still in its initial stage, the project team will continue to explore better approaches for curbing climate change and seek to make humble contributions to the betterment of mankind.

CAFS Research team

July 30<sup>th</sup>, 2017

### Foreword

The world is entering a new phase of development characterized by the Sustainable Development Goals (SDGs). The SDGs represent a higher level of ambition compared to the Millennium Development Goals (MDGs), given its attempt to achieve multi-dimensional sustainability. Environmental sustainability in particular, has gained increasing attention for its significance in ensuring sustained, inclusive and balanced economic growth. It requires a concerted effort to combat climate change and protect biodiversity as well as natural resources.

China has attached great importance to addressing climate change. It has enacted a series of goals to guide its efforts and investments. For instance, China submitted its Intended Nationally Determined Contributions (INDC) in 2016, putting forward its mitigation pledges in a domestic context. By 2030, China will aim to lower its carbon dioxide emissions per unit of GDP by 60-65% from the 2005 level<sup>1</sup>. As China is the world's largest carbon-emitting country, it will also cap the carbon dioxide emissions by around the same time and make efforts to peak earlier. South-south cooperation on climate change is also an integral part of the INDC outline<sup>2</sup>. In line with the changing international landscape of global economic governance, China has recalibrated its position by scaling up the South-South Cooperation Fund on Climate Change (SSCFCC) to RMB20 billion (US\$3.1 billion).

Expectations are therefore high for China to play a pioneering role in promoting green growth. The expectations are not unfounded. A lot has taken place in China at the top rungs of leadership and strategic development planning levels to prioritize green development, as evidenced in China's 13<sup>th</sup> FYP (2016-2020).

#### 1. Ecological civilisation in China's 13th FYP

The 13<sup>th</sup> FYP possesses five major development ideas: innovation, coordination, green, open and sharing. Green growth has, therefore, become one of the overarching principles to guide development by 2020. To accelerate green growth, China is in pursuit of an "Ecological Civilisation"; a new vanguard ideology highlighted in the 13<sup>th</sup> FYP. The concept was first proposed in the report of the 17<sup>th</sup> National Congress of Communist Party of China (CPC), and then integrated as one of the essential elements of the "five-in-one"; being given equal importance with the economic, political, cultural and social development outlined in the 18<sup>th</sup> National Congress.

<sup>1.</sup> The climate change targets for China are highlighted in the INDC documents: Available here: http://www4.unfccc.int/ submissions/INDC/Published%20Documents/China/1/China's%20INDC%20-%20on%2030%20June%202015.pdf 2. Available here: https://eneken.ieej.or.jp/data/6813.pdf

The concept is rooted in Chinese philosophy, which states that humankind and nature are two inseparable parts and thus in unity. What defines ecological civilization has been intensively discussed and broadly understood from two perspectives<sup>3</sup>. First, seen from a temporal lens, an ecological civilization is considered a product evolved from industrialization. The idea is to address the balance between humankind and nature in the sense that societal development should rely on nature, making the best use of it while respecting, protecting and adapting to it. Second, seen from an endowment perspective, an ecological civilization is regarded as an overall framework that consists of several elements. This means, to construct an ecological civilization entails multi-dimensional efforts to adjust to patterns of production and consumption, institution set-ups, and the rule of law.

To sum up, an ecological civilization is the concept that "human prosperity can and should be achieved in a manner that respects the capacity of nature"<sup>4</sup>. It promotes the efficient use of natural resources and low-carbon development, as well as the safety and health of the natural environment. It is largely in line with the principles of sustainable development, which are the basis for the SDGs.

The 13<sup>th</sup> FYP has outlined a series of targets to be achieved to further green growth. These can be categorized into two main groups<sup>5</sup>. One group of targets addresses relative green growth, focusing on the efficiency of resource/energy use, while the other group – absolute green growth – pays attention to total resource/energy consumption (Table 1).

Group	Targets
Relative green growth	<ul> <li>Energy consumption per unit of GDP to be reduced by 15% in 2020 (compared with 2015)</li> <li>Reduction of carbon dioxide emissions per unit of GDP by 40-45% by 2020 (compared with 2015)<sup>6</sup>.</li> </ul>
Absolute green growth	<ul> <li>Reduction of water consumption by 35% by 2020 as compared with 2013<sup>7</sup></li> <li>Estimated total consumption of primary energy in 2020 of less than 5 billion tonnes of standard coal.</li> </ul>

#### Table 1 Main green growth targets outlined in the 13<sup>th</sup> FYP

<sup>3.</sup> Lian, G., 2014. Ecological civilization and green finance practice. China Finance Publishing House. (in Chinese)

<sup>4.</sup> South-south cooperation for ecological civilization, 2016. China Council for International Cooperation on Environment and Development.

<sup>5.</sup> China's green growth roadmap in the 13th Five-Year Period, 2015. Global Green Growth Institute and Policy Research Center for Environment and Economy, Ministry of Environment Protection, China.

<sup>6.</sup> The target is consistent with China's Plan for Addressing Climate Change (2014-2020).

<sup>7.</sup> The target is consistent with the target in the Water Pollution Prevention and Control Action.

Moreover, a wide range of policy tools and measures are proposed to create an enabling environment for green growth. For instance, China will by 2020 establish an institutional framework composed of eight systems for promoting ecological progress, including a property rights system for natural resource assets and a system for developing and protecting territorial space<sup>8</sup>. To enhance environmental governance, China has also enacted the Environmental Protection Law and Air Pollution Control Law since 2015. In the 13<sup>th</sup> FYP period, the laws intend to impose a responsibility system to prevent improper interference from local governments and encourage public participation in mitigation obligations.

Another example relates to the projects planned for air, water and land pollution controls<sup>9</sup>. In terms of pollution control, there will be 10 million mu (6,667 square kilometers) of contaminated arable land restoration and 40 million mu (26,667 square kilometers) of contaminated farmland risk controls put in place to protect high-quality grasslands<sup>10</sup>. Regarding waste treatment measures, there will be the construction of five low-level radioactive waste disposal sites and a high radioactive waste disposal underground laboratory. To design green infrastructure and preserve natural capital, the government will set up a new soil erosion governance area of 270,000 square kilometres and a national wetland area of not less than 800 million mu (533,333 square kilometers). In total, 10 measures will be conducted for land pollution prevention, with 20 measures already taken for air and water pollution.



Figure 1 Purposes of green measures outlined in the 13<sup>th</sup> FYP

Source: 13<sup>th</sup> FYP

<sup>8.</sup> The reform plan is published in full text. Available here: http://news.xinhuanet.com/english/china/2015-09/21/c\_134646023.htm 9. The full text of 13th FYP is released by NDRC. Available here: http://en.ndrc.gov.cn/newsrelease/201612/P020161207645765233498.pdf

<sup>10.</sup> Source: Xinhua. Available here: http://en.xfafinance.com/html/Policy/2015/155187.shtml

#### 2. Climate public expenditure institutional review

While more and more policy tools and measures are being put forward to advance green development in China, are there relevant institutional set-ups in place to make sure that policies are properly implemented? Has green growth been prioritized with enough monetary support? Have strategic green initiatives been budgeted for? Has green financing been aligned with green investment needs? All of these are key questions to address in order to enable evidence-based decision-making.

Against this backdrop, the Climate Public Expenditure Institutional Review (CPEIR) provides an opportunity to systematically review a country's institutional support, policy portfolios and public spending to see how they relate to climate-related activities. It has been initiated by the United Nations Development Program (UNDP) Asia-Pacific Regional Center and implemented in over 20 countries since 2011. The review serves as an innovative tool that ultimately helps to build a comprehensive climate change financing framework aimed at both national and subnational levels. Its findings and recommendations strive to use climate change considerations in budget making and tagging, as well as support efforts that attempt to 'green-wash' the public financial management system.

In China's context, CPEIR hopes to help better understand the financial, institutional and policy issues that could lead to more effective changes at all pertinent levels, in order to further the ecological civilization vision. This exercise hopes to provide useful insights that could serve on-going efforts to promote green development, including green finance.

#### 3. Green finance in China

China has invested heavily in support of the transition to greener development. Over the course of the 11<sup>th</sup> FYP (2006-2010), China invested approximately US\$256 billion in the new energy sector and US\$127 billion in energy efficiency<sup>11</sup>. In 2012, the central government allocated RMB97.9 billion (US\$14.2 billion) to energy-saving emission reduction and renewable energy special funds, along with investment dollars for agriculture, water resources, marine management, health and meteorological activities<sup>12</sup>.

However, the demand for financial support is significant in China, considering the scale of needed investment for sustainable energy, energy and resource efficiency, environmental remediation and protection and pollution control, as well as green infrastructure and products. In early 2015, the People's Bank of China estimated that the country needed annual investments of 3% of the country's GDP to address climate, water and land issues over the next five years<sup>13</sup>.

<sup>11.</sup> Available here: http://newenergynews.blogspot.tw/2013/03/todays-study-chinas-new-energy.html

<sup>12.</sup> Available here: http://www.sckxzx.com/index.php?\_m=mod\_article&\_a=article\_content&article\_id=98

<sup>13.</sup> Force, G. F. T. (2015). Establishing China's green financial system. People's Bank of China: Beijing.

In March 2016, the National People's Congress adopted the 13<sup>th</sup> FYP and explicitly proposed to "establish a green financial system and promote the development of green credit, green bonds and the establishment of green development funds."<sup>14</sup> Currently, green credit remains the primary source of green finance. By the end of 2014, China's 21 major banks registered in total about RMB6 trillion (US\$ 1 trillion) in outstanding loans to green-credit-related customers, according to China Banking Regulatory Commission (CBRC)<sup>15</sup>. China became the largest green bond market in 2016, with the total of green bond issuance amounting to US\$ 34 billion<sup>16</sup>. China's green equity market has also been developed with the disclosure of environmental information from listed companies and the launching of green securities indices and green investment funds. In addition, the insurance market has started to adopt Compulsory Environmental Liability Insurance (CELI) in China. The pilot results were, however, not fully satisfactory – with low participation of insurance companies and enterprises.

Another important vehicle to channel green finance is the Emissions Trading System (ETS) in China. The trading of carbon emission rights started running in seven locations in 2013: Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong and Shenzhen<sup>17</sup>. During this phase (2013-2015), the carbon market had a value of RMB1.1 billion (US\$160 million) and remediated 68.6 megatons of carbon dioxide<sup>18</sup>. In a further sign of reform efforts, a nation-wide ETS will be launched in 2017 and actively engage with financial and intermediary institutions to develop innovative carbon financial products.

The People's Bank of China and seven other ministries and commissions officially released guidance for the construction of green financial systems in China on August 31, 2016<sup>19</sup>. Its goal is to open green finance to a full range of deployment avenues in China. Tax subsidies and commercial green bank subsidiaries are to be established based on the conventional green credit, bond, equity and insurance products<sup>20</sup>. Proposed incentives include offering a preferred deposit reserve ratio, releasing controls on supplementary mortgage loans, and allowing a less stringent loan risk weight. In addition, China will set up off-site carbon emissions derivatives businesses and promote environmental stress testing in financial institutions to strengthen international cooperation in the field of green finance continuously<sup>21</sup>.

<sup>14.</sup> The original texts of 13th FYP are in Chinese. Available here: http://www.china.com.cn/lianghui/news/2016-03/17/ content\_38053101\_13.htm

<sup>15.</sup> Green finance booming among Chinese banks. Available at: http://www.chinadaily.com.cn/bizchina/greenchina/2015-08/26/ content\_21709767.htm

<sup>16.</sup> Green finance progress report, 2017, UN Environment

<sup>17.</sup> Source: CCICED. Available here: http://www.cciced.net/cciceden/PublicationsDownload/201702/P020170210473297581978.pdf 18. Source: The Climate Group. Available here: https://www.theclimategroup.org/news/spotlight-china-new-emissions-trading-

system-set-revamp-global-market

<sup>19.</sup> The document name is "Guidelines for Establishing the Green Financial System". Available here: http://gongwen.cnrencai.com/ yijian/92291.html

<sup>20.</sup> Green bank examples include Industrial Bank, CITIC Bank and ICBC. Available here: http://news.163.com/16/0229/02/ BGV7K4LA00014AED.html

<sup>21.</sup> Available here: http://www.nbd.com.cn/articles/2017-01-12/1069585.html

#### 4. The Belt and Road Initiative and green development

The Belt and Road Initiative (BRI) was initiated in China back in 2013. It aims to optimize resource allocation and utilization across countries and regions through connectivity in economy, finance, policy and culture, which has the potential to ultimately drive another wave of regional growth through international dialogue and cooperation.

The BRI has received a lot of attention globally given its great perceived potential to promote sustainable development. The initiative is found closely linked to the SDGs in multiple dimensions<sup>22</sup>. If the two can be effectively aligned and implemented, the BRI can help countries achieve their own development objectives within the space of sustainability.

In terms of green development, the BRI possesses lots of opportunities. It can be realized through varied means, including green infrastructure and green buildings. There are many more options. Green investments, green trade and green technology transfer can all broaden the scope of south-south cooperation in green development. Moreover, the establishment of a green financial system throughout BRI countries can act as another engine of green growth. Therefore, it is of strong interest to further investigate how to maximize the potential of the BRI to facilitate green growth.

#### 5. The rationale, aims and objectives of the report

United Nations Development Program (UNDP), in collaboration with the Research Institute for Fiscal Sciences (RIFS, now renamed as Chinese Academy of Fiscal Science, CAFS), conducted the first Climate Public Expenditure Institutional Review (CPEIR) in China from 2014 to 2015. The Phase 1 report provides quantitative information on climate-related expenditures at the central government level. The research reviews a key national institutional framework that is critical to tackling climate change and effectively governing financial resource allocation. The study also touched upon climate governance experience in other developing countries and summarised lessons which may yield useful insights for China.

While China is achieving some success, the report documented the downward trend of its public expenditure. The total share of national government spending for energy conservation and environmental protection programs dropped from 2.7% in 2010 to 1.3% in 2013. Adding to this, the report found that 7% of the central government budget was spent on measures directly or partially targeted to address climate change in 2014 (Figure 2).

<sup>22.</sup> Pingfan Hong, 2016, "Jointly building the 'Belt and Road' towards the Sustainable Development Goals", United Nations Department of Economic and Social Affairs



Figure 2 Central government expenditure classified according to climate relevance (Unit: 100 million RMB)



Building on the success of the first phase of national CPEIR, UNDP and CAFS jointly initiated the second phase, where analyses will take place at the provincial level. Ultimately, central policies need to be localised to take effect. To achieve this, fiscal spending is of paramount significance to support and direct policy making. Therefore, a provincial CPEIR could help better understand the governance structure for climate action and the scale of climate-relevant spending at the provincial level, so as to provide useful information for budget planning. Going one step further, the report will preliminarily assess the cost-effectiveness of climate spending. This exercise is to help identify entry points where money could be better managed and spent to maximise expected impacts.

Specifically, the report aims to: 1) establish a baseline of climate-related expenditure at the provincial level; 2) assess whether or to what extent public expenditure on climate-related activities complies with policy priorities and strategies on climate change or green growth at the provincial level; and 3) identify bottlenecks and opportunities to strengthen the enabling environment to attain the vision of these goals and policies.

UNDP

July 31<sup>st</sup>, 2017

### **Executive Summary**

Climate change has increasingly become a global challenge for sustainable development. Accelerating the building of an ecological system has been made a main measure by China to address climate change and maintain global ecological security. It has also been incorporated into top national social-economic development planning. Local governments have formulated many policies and regulations to address climate change, and budgeted for relevant activities. Provincial governments play an important role in this regard. The study of climate public expenditure and institutions at the provincial level is of great significance, as it portrays the dynamic practices at work in the establishment of an ecological civilization, explores a unique way of developing such a civilization, contributes to decision-making focused on addressing climate change and helps with the comparison of and exchanges between local climate public expenditure and that of other countries.

Hebei is located in the North China Plain, bordering Beijing and Tianjin with Bohai Bay to its east. Hebei is an industrial province. It has a large amount of steel production, accounting for 1/4 of China's total; it is thus burdened by the conflict between the use of environmental resources for economic development and the pressure and challenge of environmental governance. In recent years, Hebei has galvanized to combat climate change, witnessing an increase in climaterelated public expenditure. Hebei has thus been chosen as a case to study the climate public expenditure of the local government, to understand where the local government's public expenditure is going, and to offer experience to, and promote the ongoing efforts of, other local governments.

#### I. Hebei climate public expenditure and institutional review

By evaluating Hebei's climate public expenditure and institutions, we reached the following conclusions:

**1. Climate change has been given increasing attention, and climate-related public expenditure is growing year by year.** Evaluation results showed that climate public expenditure increased year by year during the 12<sup>th</sup> FYP period. In particular, since 2015, Hebei has made more investment in energy conservation and environmental protection, and the public expenditure highly related to climate increased 38.7% compared to the previous year. Based on relevant analysis, public expenditure highly or moderately related to climate change increased from 8.23% of the total expenditure in 2011 to 11.29% in 2015. In terms of the share of climate spending in total fiscal expenditure, Hebei's climate public expenditure accounted for a higher percentage point than that of the central government.

**2. The methodology to systematically review climate spending has been expanded.** The first phase in the evaluation of climate public expenditure and its system was based on a statistical classification methodology of relevance to climate change, used to study expenditures at the central government level. In the second phase of the evaluation, more approaches were used

to derive the desired statistics. Based on the statistical classification methodology by relevance, mitigation and adaptation to climate change were two core dimensions. This report found that statistics based on these dimensions were able to calculate climate public expenditure more precisely, which provided a foundation for cost-effective analysis and performance evaluation.

In response to the above-mentioned conclusions from the evaluation of climate public expenditure and its system, this report brings forward the following suggestions:

1. The vision and policies of top leadership can be further improved to form a sound interaction between the government, the market and the society.

2. China's budget management system can be further reformed to enhance the efficiency and effectiveness of policies and fund use.

3. Fiscal spending can be further refined, and a restraint mechanism controlled by the market can be established.

4. Research on the cost-benefit evaluation of public expenditures concerning climate-related issues can be strengthened.

#### II. Cost-benefit analysis of over-capacity reduction in Hebei

Climate change is closely related to economic development patterns. Turning toward a lowcarbon model of economic development is necessary in order to address climate change issues. Currently, China is promoting supply-side structural reform, of which reducing overcapacity is one important aspect. By overcapacity reduction, production patterns can be optimized and upgraded, resource utilization efficiency could increase, industrial emission could be reduced, and the quality of economic development could be improved—it is a significant measure to cope with climate change. Considering that overcapacity reduction is one of the most important measures taken by Hebei in recent years, this report chose it as the case study. Through field investigations into relevant government agencies and enterprises, this report conducted a systematic analysis of the costs and benefits of overcapacity reduction in Hebei, and tried to establish a methodological framework for cost-benefit evaluation of public climate expenditure.

Through cost-benifit analysis of overcapacity reduction, this report has drawn the following conclusions:

**1. Overcapacity reduction is a significant measure for dealing with climate change; more research should be done in this area.** The promotion of low-carbon models of economic development is critical for China to address its domestic climate change-related challenges. Overcapacity reduction is necessary to close outdated production facilities and promote the transformation of economic development patterns, improve the quality of economic development and cope with climate change.

**2. The high cost of overcapacity reduction is shared by relevant parties, including government and enterprises.** Based on the features of the different parties involved, as well as on the concept and classification of visible cost, invisible cost and opportunity cost, this report presents the cost of overcapacity reduction in a matrix. This multi-dimensional matrix shows that in the process of overcapacity reduction, all parties, including government, enterprises and banks, pay very high prices. In the analysis of total cost, we should pay attention not only to the explicit expenditure of special funds provided by the central government, provincial government and county government, but also to the implicit expenditures spent by other related entities, including other government levels, enterprises and banks. Although it is hard to make an accurate quantitative analysis of the latter, implicit expenditures should not be ignored.

**3.** Overcapacity reduction has achieved notable results in terms of economic and social outcomes, as well as in the field of sustainable development. Overcapacity reduction by altering modes of production in the industrial process, aims at transforming China from an extensive economy to a circular economy by reducing the pollution caused by industrial waste and by lowering the human impact on climate change. It is an integral part of constructing an ecological civilization; achieving such a civilization is critical for improving people's living standards and protecting the natural environment. Overcapacity reduction has been associated with social benefits, such as improving population health through the creation of a cleaner and less toxic environment. With a more responsible utilization of resources, sustainable development can be achieved, which is crucial for stabilizing employment, increasing worker incomes, and ultimately giving people a better livelihood. It also results in economic benefits, such as enhancing the quality of economic development, promoting the transformation and upgrading of the economy, and optimizing industrial structures and distribution channels.

**4.** In the short run, the cost of overcapacity reduction outweighs the benefits; in the long run, however, the benefits are greater than the cost. Combining field research of the enterprises in Hebei with the analysis of costs and benefits, this report concludes that the cost of overcapacity reduction is higher than the benefits in the short term, creating a stress on expenditures for the government, enterprises and banks over the present period. According to the data analysis of industrial liabilities, costs, and profits in Hebei, overcapacity reduction leads to the rise of costs and the decline of profit margins in the enterprises studied. However, in the long term, the benefits exceed the cost. From a microscopic perspective, overcapacity reduction, which is realized by improving production factors, including environmental protection, energy consumption, quality and safety, is able to eliminate outdated capacity effectively and lower the overall social production cost. With the adjustment of production structures, value is added and the profits of enterprises go up. From a macroscopic view, overcapacity reduction is beneficial for economic, social and ecological sustainability.

Based on our cost-benefit analysis of overcapacity reduction projects, this report brings forward the following suggestions:

1. Overcapacity reduction should be taken into consideration while developing strategies for achieving a circular economy and optimizing industrial distribution.

2. The policies related to the cutting of overcapacity should be implemented with corresponding tactics and dynamic optimization.

3. The policy of awards and subsidies implemented by the central government should be improved.

4. The multi-dimensional matrix analysis framework of the costs and benefits of climate public expenditure needs further improvement.

5. The collection and consolidation of basic public climate expenditure related data needs further strengthening.

# List of Acronyms

AAA	American Accounting Association
BEP	Bureau of Environmental Protection
BHRSS	Bureau of Human Resources and Social Security
BIIT	Bureau of Industry and Information Technology
BOF	Bureau of Finance
ВОМ	Bureau of Meteorology
CAFS	Chinese Academy of Fiscal Science
CBRC	China Banking Regulatory Commission
ССА	China Cost Association
CELI	Compulsory Environmental Liability Insurance
СРС	Communist Party of China
CPEIR	Climate Public Expenditure Institutional Review
DDG	Deputy Director General
DEP	Department of Environmental Protection
DF	Department of Forestry
DG	Director General
DIIT	Department of Industry and Information Technology
DOA	Department of Agriculture
DOF	Department of Finance
DRC	Development and Reform Commission
DWR	Department of Water Resources
ETS	Emissions Trading System

FYP Five-Year Plan

GDP	Gross Domestic Product
HFPC	Health and Family Planning Commission
IPCC	Intergovernmental Panel on Climate Change
INDC	Intended Nationally Determined Contributions
LTFTCC	Leading Task Force on Tackling Climate Change in Hebei
MDGs	Millennium Development Goals
SDGs	Sustainable Development Goals
SSCF	South-South Cooperation Fund
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change

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### **Report I:**

Climate Public Expenditure and Institutional Review at the Provincial Level in China

——A Study of Hebei Province

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# 1. The necessity of climate public expenditure and institutional review at the local level

Climate change and its impacts have raised worldwide attention. The Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change (IPCC) noted that between 2000 and 2010, anthropogenic greenhouse gas emissions increased by an average of 2.2% per annum, higher than the average annual growth rate of 1.3% during the previous 30 years. Since start of the 21<sup>st</sup> century, the global sea level has risen 19cm, with a mean annual increase of 1.7mm. The human environment is changing at an alarming rate.

Increasing temperature, rising sea level, extreme climate and many other events pose a serious challenge to human survival and development. On the one hand, the IPCC report pointed out that since the beginning of this century, economic losses from natural disasters induced by global warming have been as high as US\$2.5 trillion. By 2050, annual losses are expected to exceed US\$1 trillion. Climate change also inflicts direct harm on people's health through heat stress response, the accelerated transmission of infectious diseases, and the deterioration of human living conditions.

China will accelerate the construction of an ecological civilization as a major measure to adapt to climate change and safeguard global ecological security; to do so, it has incorporated climate change into its national economic and social development planning. Furthermore, local governments have also developed a significant number of policies and regulations to cope with climate change effectively. Public expenditure is an important tool for local authorities to deal with climate change, and it is seen an essential part of evaluating the mechanisms for tackling climate change at the provincial level.

#### 1.1 Provincial governments play a significant role in tackling climate change

### **1.1.1 Tackling climate change needs to be implemented through provincial governments**

From the academic point of view, local implementation could help alleviate the problem of information asymmetry. Although central decision-making could overcome the externalities of tackling climate change, maintain a unified market and avoid the 'prisoner's dilemma', while taking into account information asymmetry, local governments have more informational advantages at the operational level than at the level of the central government. It could contribute to cost reduction if specific work is implemented locally.

From the perspective of current resource allocation, local regions are the main receivers. Take the four areas highly related to climate change, namely a) energy conservation and environmental protection, b) agriculture, forest and water resources, c) land resources and marine meteorology and d) heath care; the total national expenditure in 2015 was RMB3625.126 billion (US\$566.426 billion), among which central government expenditure was RMB151.764 billion (US\$23.713 billion), accounting for only 4.34% of the national expenditure. In contrast, local expenditure accounted for more than 95%, assuming a role of vital importance.

#### 1.1.2 Proper tackling climate change is the key to local sustainable development

On the one hand, climate and environmental issues have severely affected local economic and social development. Climate and environmental change increase the frequency and destructive power of extreme weather. Waterlogging, flood, drought, typhoon, hail, low temperature and frost weather, snow and other climatic conditions have seriously affected people's livelihoods. According to the data of the National Disaster Reduction Office, natural disasters in 2015 affected 186 million people in China and caused an economic loss of RMB270.4 billion (US\$42.25 billion). Climate and environmental change have become the most pressing threat to local sustainable development. Local governments must properly adapt to climate change and achieve green low-carbon sustainable development.

On the other hand, proactive tackling climate change provides major opportunities to promote local economic and social development and transformation. China, a country with relatively poor resources, low per capita income and a large quantity of people in poverty, is facing many challenges, such as economic development, poverty reduction, livelihood improvement, environmental protection and tackling climate change. With the previous development model, the resources and energy needed for production and consumption in China have exceeded the ecological carrying power, resulting in an increase of pressure on the available resources and the environment as a whole. Active climate change adaption is needed to improve resource conservation, eliminate the pressure on resources and the environment and meet the demands for economic growth among those consumers with the least resources.

## **1.2 Public expenditure is an important tool for provincial governments to address climate change**

#### 1.2.1 Climate externalities requires financial support

It is generally believed that climate change refers to the rise in temperature and increase in storm activities at the global level, a statistically significant change in the average distribution of weather patterns or a change lasting for an extended period of time. Though climate change may be caused by an internal factor in nature, existing studies have shown that long-term climate change mainly results from human activities, such as carbon dioxide emissions. In Article 1 of the United Nations Framework Convention on Climate Change (UNFCCC), "climate change" is defined as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

Climate change is both an environmental issue and a development issue because climate change has distinct externalities that need to be managed. The existence of externalities leads to inconsistencies between private and social marginal costs and between private and social marginal revenue, which distorts the pricing signals and makes the market equilibrium of products and services based on market competition, as opposed to Pareto-optimal. Positive and

negative externalities in climate change affect the efficiency of resource allocation and can lead to market failure. Market failure requires government intervention and financial support<sup>23</sup>.

#### 1.2.2 The public nature of finance determines the need to tackling climate change

In its 1997 World Development Report, the World Bank summarized that the core mission of each government consisted of five essential responsibilities, reflecting the general functions exercised by modern governments: determining a legal basis; maintaining an intact policy environment, including the maintenance of macroeconomic stability; investing in basic social services and infrastructure; protecting vulnerable groups; protecting the environment.

Climate change concerns human survival. Tackling climate change should thus be an integral part of the government's responsibility to its polity. Global practices demonstrate that governments are the leaders and organizers in the promotion of tackling climate change. Moreover, it is necessary for finance, an essential pillar of state governance, to actively and extensively participate in tackling climate change.

#### 1.2.3 Finance guides expenditure on tackling climate change in various ways

#### (1) Fiscal policy is an important tool to address climate change

As an important policy tool for the government to carry out economic regulation, fiscal policy has a significant influence on improving market mechanisms and promoting a comprehensive and coordinated development of the social economy. Especially in the context of addressing climate change, since it has the quality of a public good, addressing market failures caused by its externalities must rely on effective fiscal policy measures. Fiscal policy has been a major tool for governments to tackle climate change. It is also important to coordinate and consolidate fiscal, financial, industrial and other policies in developing strategies to mitigate and adapt to climate change.

#### (2) Fiscal policy is the material guarantee for tackling climate change

Tackling climate change requires huge capital investment. Considering the relatively high risks and uncertainties associated with climate change, the private sector is seldom willing to invest. Therefore, public investment constitutes the main source of funding for tackling climate change. Specifically, taxation is the primary source of government revenue and thus necessary for governments to provide public goods and implement public functions. Apart from stimulating and restricting functions, taxation has the role of raising environmental funds to promote green growth. The introduction of carbon taxes can provide a stable and adequate source of funding for tackling climate change by improving the environmental resource tax and environmental consumption tax and thus further expanding the environmental tax base. Public financial investment in tackling climate change is also important for stimulating investment and involvement from enterprises and society as a whole. Therefore, fiscal policy offers a guarantee

<sup>23.</sup> Report on Climate Public Expenditure and Institutional Review in China, CAFS, 2015

for governments to fund activities to mitigate and adapt to climate change. It is necessary to increase the budget for tackling climate change and gradually establish a stable investment mechanism through which to fund projects.

#### (3) Fiscal policy has an important role in addressing climate change

The governing role of fiscal policy in climate change adaption mainly concerns its stimulating and restricting functions for energy conservation, energy substitution and new energy development. The stimulating function of fiscal policy in tackling climate change is demonstrated across three aspects. First, it encourages positive externalities, which is to say governments offer corresponding tax relief or financial subsidies to those externalities conducive to resource conservation and environmental protection, and so turn the external benefits into internal economic benefits for the economic entity. Second, through financial subsidies, accelerated depreciation, investment tax compensation and other tax expenditure policies such as subsidies for energy-saving electronic products, increased support for the environmental protection industry and energy conservation sector enables financial capital to guide, encourage and attract social capital investment and establish stable environmental investment channels. Third, it promotes the development and promotion of energy-saving technologies and new environmental protection technologies via financial investment, tax incentives and other measures.

The restricting function is mainly reflected in the restrictions and penalties for waste and on high energy-consuming industries; such restrictions and penalties demand the internalization of negative impacts in order to improve the efficiency of the use of resources and energy, reduce greenhouse gas emissions and achieve sustainable economic and environmental development. Though value-added taxes, resource taxes and consumption taxes in the current taxation structure are not an environmental tax per se, they have played an active role in guiding resource utilization and environmental protection. In the new round of tax reform, consumption taxes will introduce some high pollution and high energy consumption products into the scope of taxation, which will not only help raise funds, but also strengthen environmental protection and resource conservation<sup>24</sup>.

## **1.3 The importance of climate public expenditure and institutional review at the provincial level**

#### 1.3.1 To document the effective practices of an ecological civilization in China

The concept of an ecological civilization is unique in China, which when compared with the tradition of using and conquering nature, lays more emphasis on the harmonious coexistence of man and nature. The construction practices of China's ecological civilization are meant to explore a path to modern economic and social development that is in line with traditional Chinese thinking and with the goal to provide support for other countries through Chinese concepts and

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<sup>24.</sup> Report on Climate Public Expenditure and Institutional Review in China, CAFS, 2015

practices. Local governments are the main implementing agencies in the construction of China's ecological civilization. Climate public expenditure and institutional reviews at the provincial level will help to reproduce the practices of China's ecological civilization construction effectively.

#### 1.3.2 To support decision-making in tackling climate change

Currently, there are relatively few statistical analyses of climate finance in China; an increase in such analysis will assist the government and society to understand the expenditure details of climate finance, improve the budget system and enhance fund efficiency. At the same time, tackling climate change work by local governments is a pilot under the guidance of the central government. More climate public expenditure and institutional reviews of provincial governments could sum up local experience and promote scientific decision-making in tackling climate change.

#### 1.3.3 To compare and exchange view on domestic and foreign climate expenditure

A comprehensive analysis and scientific review of climate public expenditures of local governments in China will help to conduct a comparative analysis of the climate expenditures between China and other countries, evaluate the China's achievements in tackling climate change and in the construction of its ecological civilization, and promote international exchanges.

#### 2. Climate change and public policies in Hebei

Hebei Province is an area with a dilemma between resources/environmental conditions and development. Those charged with environmental governance are facing enormous challenges. In recent years, however, Hebei has made significant contributions to tackling climate change. To select Hebei as a case study for analyzing and assessing local governments' policies and climate public expenditures can help estimate the overall climate expenditure of local governments in China, provide useful lessons and encourage local governments to tackle climate change effectively.

#### 2.1 The status of climate change in Hebei

#### 2.1.1 The geographic and climatic profile of Hebei

Located in North China, Hebei Province is in the south of the Yanshan Mountains, north of the Yellow River and east of Taihang Mountains. Nestled between the city of Beijing, Tianjin and the Sea of Bohai, Hebei encompasses rich fields to its east, and neighbors Inner Mongolia, Liaoning, Shanxi, Henan and Shandong Provinces. With a coastline 487 kilometers long, it has a total area of 187,700 square kilometers and a total population of 67 million. Currently there are 11 provincial-level cities, 23 county-level cities, 108 counties, 6 autonomous counties and 35 municipal districts in Hebei. The province's terrain tilts from northwest to southeast. The northwest parts are mountains, hills and plateaus, among which are basins and valleys. The

central and southeastern parts are vast plains. The average altitude of the Bashang plateau falls between 1200-1500 meters, and the Bashang plateau accounts for 8.5% of the total land area of the province. The Yanshan Mountains and Taihang Mountains, including some hills and basins, are mostly of an elevation below 2000 meters above sea level, accounting for 48.1% of the total land area of the province. The Hebei plain is part of the North China plain, with an altitude of below 50 meters, accounting for 43.4% of the total land area of the province. Hebei has a temperate continental monsoon climate; there are 2303.1 hours of the sunshine per annum; the annual frost-free period varies from 81 days to 204 days; the average annual rainfall is 484.5mm; the monthly average temperature is below  $3^{\circ}$ C , whereas in July the average is 18  $^{\circ}$ C to 27  $^{\circ}$ C ; there are four distinct seasons<sup>25</sup>.



Figure 1 Geographic map of Hebei

<sup>25.</sup> About Hebe, data from the official website of Hebei provincial government. http://www.hebei.gov.cn/ hebei/10731222/10751792/index.html.

 $T B P_1 CS (2008) 137 2^{10}$ 

People's Republic of China

Figure 2 The location of Hebei in China

From the perspective of the trend of climate change, according to the Hebei Implementation Plan for tackling climate change issued by the Hebei provincial government in 2008, the average temperature of Hebei has increased nearly 1.4°C over the past 50 years; precipitation has dropped by about 120mm; the drought area is expanding at a speed of 1.4% every decade. Such global warming will further intensify in the future. By 2030 the annual average temperature in Hebei will rise by at least 1°C ; annual precipitation will increase by 3% -13%.

#### 2.1.2 The economy structure and greenhouse gas emissions of Hebei

Hebei is a major industrial province. Its GDP reached RMB2,980.61 billion (US\$465.72 billion) in 2015, among which the secondary industry accounted for 48.3%, 7.8 percentage points higher than the national average, and the tertiary industry accounted for 40.2%, 10.3 percentage points lower than the national average.

The main products of Hebei include steel and electro-mechanics. Based on World Steel in Figures 2014 data, world crude steel production in 2013 totalled 1.606 billion tons. As the world's largest steel producer, China accounted for 48.5% of world crude steel production. As China's biggest steel-producing province, Hebei accounted for 11.6% of global crude steel production, far larger than the world's second largest steel producer, Japan, and even higher than the total volume of the 27 member countries of the European Union.

While Hebei is facing enormous challenges in the area of climate change governance, it has also achieved considerable success. According to the China Statistical Yearbook, the total discharge of industrial emissions in Hebei in 2010 was 5,632.4 billion standard cubic meters, accounting for 10.85% of the national emissions in the year, which was more than three times the average discharge of other provinces. The reduction of steel production capacity in 2014 took up 56% of the national task. But by 2015, energy consumption and emissions indicators in Hebei dropped: energy consumption per unit industrial added value was 1.64 tons of standard coal/10,000 yuan, down 33.6% compared with 2010; in 2014, emissions of the main industrial pollutants COD amounted to 151,400 tons, among which amide and nitride were 918,000 tons, a 20.7% and 21.8% decrease respectively compared with 2010; the proportion of the main industrial waste gas pollutants (sulfur dioxide, nitrogen oxides, smoke dust) within the total national emissions declined to various degrees; the capacity reduction objective was also successfully completed.

#### 2.2 Planning and regulation

In order to promote tackling climate change in an orderly manner, the Hebei provincial government formulated a series of plans, programs and documents. In 2014, the State Council issued the National Plan on Climate Change (2014-2020), which provided measures in nine categories and 40 sub-categories on tackling climate change. We followed this framework to classify the relevant documents issued (abridged) in Hebei (see Table 1 for details).

	Measures	Related Documents
Control greenhouse gas emission	Measures Adjust industrial structure Optimize energy structure Strengthen energy conservation Increase carbon sinks of forest and ecosystem	Related DocumentsThe 13th FYP for the Development of EquipmentManufacturing Industry in HebeiThe 13th FYP for the Industrial Transformation andUpgrading in HebeiThe 13th FYP for the Development of StrategicEmerging Industry in HebeiThe 13th FYP for the Development of Petrochemical
	Control industrial emissions Control emissions from urban and rural construction Control traffic emissions Control emissions in the agriculture, commerce and waste disposal Advocate low-carbon life	Industry in Hebei Opinions of the General Office of Hebei Provincial People 's Government on the Implementation of Promoting the Development of Biological Industry Comprehensive Implementation Plan of Hebei for Energy Saving and Emission Reduction Opinions of Hebei Provincial People 's Government on Implementing the Green Hebei Project Opinions of the Hebei Provincial People 's Government on the Implementation of Accelerating the Ecological Restoration of the Forest and Lake

#### Table 1 Related documents on tackling climate change issued by Hebei in recent years

		The 13 <sup>th</sup> FYP for Meteorological Development in Hebei Opinions of Hebei Provincial People 's Government on the Implementation of Technical Transformation of Industrial Enterprises Industrial and Civil Fuel Coal (DB13 / 2081-2014) Clean Granular Coal (DB13 / 2122-2014) The Outline of the 13th FYP for Housing and Urban- Rural Development in Hebei
Adapt to the impacts of climate	Improve the resilience of urban and rural	The 13 <sup>th</sup> FYP for Water Resource Development in Hebei
change	infrastructure	Methods of Registration of Water Right in Hebei
	Strengthen water resources management and facility	Pilot Project of Comprehensive Control of Groundwater Over-exploitation in Hebei in 2015
	construction	Regulations of Hebei on Groundwater Management
	Improve the resilience of agriculture and forestry	Outline for the Implementation of Protecting Water Safety in Hebei
	Improve the resilience of marine and coastal areas	The 13 <sup>th</sup> FYP for the Development of Modern Agriculture in Hebei
	Improve the resilience of ecologically fragile areas	The 13 <sup>th</sup> FYP for the Development of Forest Industry in Hebei
	Improve people's resilience	Opinions of Hebei Provincial People 's Government on Implementing the Green Hebei Project
	Strengthen the system	The Marine Environmental Protection Plan of Hebei
	construction of disaster prevention and reduction	The 13 <sup>th</sup> FYP for the Development of Marine Economy in Hebei
		The Wetland Conservation Plan of Hebei (2015-2020)
		The 13 <sup>th</sup> FYP for Hygiene and Health in Hebei
		The Emergency Plan for Heavy Pollution in Hebei
		Atmospheric Pollution in Hebei
		Emergency Plan for Emergency Environmental Events in Hebei

Implement pilot demonstration projects	Deepen the low-carbon pilot projects in provinces and cities Carry out low-carbon park, commercial and community pilot projects Implement carbon reduction demonstration projects on tabling diment pilot projects on	Conducted low-carbon pilot demonstration and circular economy demonstration Construction Plan of New Urbanization and Overall Urban and Rural Demonstration Zone in Hebei (2016-2020) Opinions on the Establishment of Clean Production Pilot Demonstration Park Implementation Plan of Air Pollution Control Programme in Hebei Province Regulations on Implementation of Action Plan for
	tacking climate change	Air Pollution Control in Beijing-Tianjin-Hebei and Surrounding Areas
Improve regional policies on tackling climate change	Urbanized areas Main producing areas of agricultural products Key ecological function areas	The General Plan of High Standard Farmland Construction in Hebei Province (2015-2020) Construction Plan of Beijing-Tianjin-Hebei Ecological Environment Support Area in Hebei Province (2016- 2020)
Improve incentive and restraint mechanism	Promote sound regulations and standards Establish a carbon trading system Establish a carbon emission certification system Improve fiscal and tax policies Improve investment and financing policies	Incentive Measures on Environmental Pollution Reporting in Hebei Province Interim Measures for the Administration of Special Funds for Air Pollution Prevention and Control in Hebei Province (for Trial Implementation) Budget Ration Standard for Restoration and Protection of Geological Environment Project in Hebei Province Measures for the Management of Provincial Environmental Protection Funds in Hebei Province Measures for the Management of Financial Reward Funds on Energy-saving Technological Transformation in Hebei Province Measures for the Management of Special Funds for Provincial Nature Reserves in Hebei Province (for Trial Implementation) Measures for the Management of for Special Funds for Technical Transformation of Industrial Enterprises in Hebei Province
Strengthen the support of science and technology	Enhance the basic research Increase efforts in technology research and development Speed up promotion and application	Measures for the Management of Financial Reward Funds on Energy-saving Technological Transformation in Hebei Province Measures for the Management of Special Funds for Technical Transformation of Industrial Enterprises in Hebei Province

Strengthen capacity building	Improve the greenhouse gas statistical system Strengthen personnel team building Strengthen education and training and public opinion guidance	Carried out statistical work on tackling climate change The 13 <sup>th</sup> FYP for the Development of Human Resources and Social Security in Hebei Province Incentive Measures on Environmental Pollution Reporting in Hebei Province
Deepen international exchanges and cooperation	Promote the establishment of a fair and reasonable international climate system Strengthen cooperation with international organizations and developed countries Carry out South-South Cooperation	
Organization and implementation	Strengthen organization and leadership Strengthen co-ordination Establish evaluation mechanism	Implementation Plan for tackling climate change in Hebei Province Opinions of Hebei Provincial People's Government on Accelerating the Construction of Ecological Civilization Implementation Plan for Ecological Civilization System Reform in Hebei Province

Source: Consolidated data from the website of Hebei Provincial Government.

As shown in the table above, Hebei Province has published nearly 50 documents in recent years on tackling climate change. These documents are basically in line with the requirements of the National Plan on Climate Change (2014-2020). Except for a lack of corresponding measures concerning international cooperation, relevant plans or regulations have been issued for the remaining areas to guide efforts. Among them, planning documents on the control of greenhouse gas emissions and tackling climate change take up the largest proportion.

In the area of financial expenditure, relevant documents have also been issued. This paper collected 6 documents in total, including the Incentive Measures on Environmental Pollution Reporting in Hebei. The specific content is listed in Table 2.

Document	Main Content	
Incentive Measures on Environmental Pollution Reporting in Hebei	According to the informant's proof on the reported matter, the degree of investigation, the degree of environmental pollution by the party being reported, or the fact that major losses of environmental pollution are avoided because of the reporting, and based on the nature and content of the report, define the amount of reward within the range of 500-3000 yuan.	
Interim Measures for the Administration of Special Funds for Air Pollution Prevention and Control in Hebei Province (for Trial Implementation)	The special funds are allocated in a manner that combines projects and factors. Items with specific projects and subsidy standards are assigned in strict accordance with the relevant criteria; other funds are distributed based on factors. The distribution factors mainly take into account the annual reduction of pollutant emissions, investment in pollution control, the reduction rate of fine particulate matter and the assessment results of the previous year, and are defined by integrating with the key tasks in the Implementation Plan of Air Pollution Control Programme in Hebei.	
Measures for the Management of Provincial Environmental Protection Funds in Hebei Province	Environmental protection funds provide priority support to the pollution control and ecological protection tasks defined by the nation and Hebei and tend to invest in the ecological environment fields or projects that produce serious environmental pollution and are closely related to people's lives. The allocation of environmental protection funds takes factors as the focus and projects as supplements. Among them, the pre-assigned environmental protection funds based on the amount of tasks will be settled according to the actual completion of the annual targets. The provincial departments applying for the environmental protection funds may, in line with the environmental protection tasks that they undertake, propose fund use plans to the provincial Department of Environmental Protection and prepare performance targets. The provincial Department of Finance and Department of Environmental Protection will consider the relevant environmental tasks and coordinate arrangements for environmental protection funds. The municipal bureaus of finance and environmental protection shall, after receiving the environmental protection funds, promptly prepare a detailed allocation plan for the environmental protection funds, and shall, upon approval according to the prescribed procedures, issue it within 30 days and submit it to the provincial Department of Finance and Department of Environmental Protection for the record. The municipal bureaus of finance and environmental protection and relevant provincial departments that use the environmental protection funds shall conduct a performance assessment of environmental protection funds based on projects and form a special evaluation report to be submitted to the provincial Department of Finance and the Department of Environmental Protection for the record. Based on the performance assessment of the local agencies, the provincial Department of Finance and the Department of Environmental Protection conduct key performance assessment.	

#### Table 2 Climate public expenditure in Hebei
Measures for the	In order to ensure the actual effect of energy-saving technological
Management of	transformation projects, energy-saving funds take the form of incentives, linking
Financial Reward	the amount of funds with the volume of energy saving by the projects and
Funds on Energy-	providing rewards to enterprises that implement energy-saving technological
saving Technological	transformation projects.
Transformation in Hebei	The incentive funds focus on the key energy-consuming enterprises implementing energy-saving technological transformation projects for existing production technology and equipment; incentive funds mainly support the enterprises' energy-saving technological transformation projects and the amount of incentives is based on the actual energy saving; the energy conservation is reported by the company and confirmed by the government. Enterprises submit the energy consumption before the transformation, energy-saving measures after the conversion, energy conservation and measurement methods, which will be identified by the government based on professional audit results. The performance indicators of the funds are set by the provincial Development and Reform Commission in line with the overall objectives of a project to determine the project's target values and report to the provincial Department of Finance for audit. The performance indicators include fund management indicators, output indicators and effect indicators. Specifically, fund management indicators include capital management norms and fund availability; output indicators include the number of project implemented, investment scale and energy efficiency; effect indicators include economic and social benefits.
Measures for the Management of Special Funds for Provincial Nature Reserves in Hebei (for Trial Implementation)	The special funds are applied for: (1) comprehensive field investigation and the planning formulation for the development and construction of reserve areas; (2) procurement of equipment for scientific research, observation, monitoring and early warning in nature reserves; (3) facilities as well as scientific researches and tests for rare and endangered species and biodiversity conservation; (4) publicity of natural ecological protection; (5) other matters conducive to the development of nature reserves.
	The special funds for nature reserves should set the performance indicators based on the performance objectives, including reporting indicators, fund management indicators, output indicators and effect indicators. Among them, reporting indicators include the integrity of application materials as well as the independence and soundness of management institutions in the reserve area; fund management indicators include normative management of the special funds and fund availability; output indicators include the number and type of management facilities and equipment, the number and quality of planning, scientific research experiments, and publicity materials; effect indicators include the operation effect of the project, protection of wild animals and plants, and protection of ecological environment.

Measures for the	The special funds mainly support the annual Transformation of Thousand
Management	Technologies Project, focusing on 10-100-1000 Project <sup>26</sup> , 3-100s Project, Model
of Technical	Project and the model enterprises.
Transformation for	The special funds provide comprehensive forms of support, including post
Industrial Enterprises in	subsidies, loan discount, equity investment and service procurement. Post
Hebei	subsidies refer to a certain amount of subsidies provided to the major technical
	transformation projects as leading role models in the industrial transformation
	and upgrading in Hebei-based on their investment in procuring fixed assets
	including equipment, and the maximum subsidy for a single project is 20
	million yuan; investment in the fixed assets of public platform projects should
	not exceed 20% of the subsidy, and for a single project it should not exceed 5
	million yuan. The discount rate shall be calculated based on the actual amount
	of the project loan and the benchmark interest rate for loan of the same period
	announced by the People's Bank. The amount of support shall not exceed 12
	months' interest and the maximum amount for a single project shall not exceed
	20 million yuan.

Source: Consolidated data from the website of Hebei Provincial Government.

For policies related to climate public expenditure in Hebei, see ANNEX I for detailed information. The information was gathered during field investigations and desk reviews of secondary sources made available to the public.

## 2.3 Climate change institutional set-up in Hebei

The Hebei provincial party committee and provincial government attach great importance to climate change and desire to set up a leading task force to tackle climate change in February 2008 with the governor as team leader. A response mechanism was established, and the Implementation Plan for tackling climate change in Hebei was formulated in accordance with the requirements of sustainable development strategy. A series of policies and measures related to climate change have been adopted, and positive efforts have been made to mitigate and adapt to climate change. The Hebei Provincial Development and Reform Commission has set up a division of tackling climate change, which is responsible for the day-to-day work of the Office for the Provincial Leading Task Force on Tackling Climate Change (see ANNEX II for a detailed description of terms and responsibilities of the varied government departments).

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<sup>26.</sup> The Transformation of Thousand Technologies Project is a key technological transformation program for provincial industrial enterprises. It was established by Hebei Province in 2014 and is updated per annum. These projects have started or have basic start conditions. The project's implementation will be of great significance for Hebei to adjust their industrial structure, change their mode of development and stabilize economic growth. The subsequent 10-100-1000 Project are the implementing measures put forward by the provincial government to promote industrial transformation and upgrading and to build a strong industrial province, which includes the strengthening of 10 major industrial bases, supporting of 100 advanced enterprises and the cultivation of 1,000 brand-name products. The 3-100s Project refers to the 100 continued construction and operation projects, 100 new start projects and 100 pre-projects, through which Hebei province aims to expand effective investment.



Figure 4 The management mechanism and institutional setup for tackling climate change in Hebei

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# 3. Analysis of the budget system of climate public expenditure in Hebei

### 3.1 The structure of budget management

China has varied levels of governance and at each level functions are performed with sufficient financial support. Therefore, each level of governance has a main budget management body which takes charge of fiscal revenue and expenditure. Article 3 of the Budget Law of the People's Republic of China stipulates that the state shall establish one budget level at each of the five levels of governance: central government; provinces, autonomous regions, and municipalities directly under the central government; cities divided into districts and autonomous prefectures; counties, autonomous counties, cities not divided into districts, and districts of a city; townships, ethnic townships, and towns. Hebei has four budget levels: provinces, cities, counties and townships.

Level	Budget Management Government
l I	Central government
II	Provinces, autonomous regions, and municipalities directly under the central government
III	Cities with districts and autonomous prefectures;
IV	Counties, autonomous region, cities without divided districts, and districts of a city
V	Townships, ethnic townships, and towns

#### Table 3 Government budget management bodies

### 3.2 Budget preparation

Departmental budgets are the basis for the general budget preparation of governments at all levels. According to the Budget Law of the People's Republic of China, government budget preparation follows a combination of top-down, bottom- up, and level-by-level procedures.

Provinces, autonomous regions and municipalities directly under the central government propose the requirements for preparing a draft budget in their administrative area; such proposals must be in line with the instructions of the State Council and the Ministry of Finance, and take into account the specific circumstances of the region.

For a local government at or above the county level, its financial department shall review the draft budgets of all the departments and prepare the draft budget and general budget at the same level. After the approval of the government of the same level, they will prepare regular reports for the financial departments of the provinces, autonomous regions and municipalities directly under the central government at the next level up. The draft general budget prepared

by the financial department of the same level should be reported to the Ministry of Finance before January 10 of the next year.

The draft budgets of local governments at all levels shall be approved by the people's congress of the same level. The financial departments of local governments at or above the county level shall, within 30 days from the date of government budget approval by the people's congresses at the same level, approve the budgets of the departments at the same level. Local departments shall, within 15 days from the date of budget approval by the financial department at the same level, approve the budgets of their respective units.



Figure 5 Budget preparation flow chart

### 3.3 Budget item setting

In order to strengthen revenue management and statistical analysis, according to the revenue composition of the Chinese government, and with reference to international classification methods, financial budget revenue is divided into class, section, item and head, based on their economic nature; the expenditure is divided into class<sup>27</sup>, section<sup>28</sup> and item<sup>29</sup> according to functions, and class and section according to their economic nature. Budget expenditures at all levels should be compiled according to their functional and economic natures.

<sup>27.</sup> It comprehensively reflects governmental functions such as defense, diplomacy, education, science and technology, social security and employment, environmental protection and so on.

<sup>28.</sup> It reflects a certain aspect of the work needed to complete governmental functions, such as general education under education. 29. It reflects the specific expenditure spent to complete a particular aspect of work, such as drought prevention and soil and water conservation under water conservancy expenditure.

### 3.3.1 Revenue classification

According to the requirements concerning government revenue, government revenue is divided into class, section, item and head, all of which are refined gradually, item by item, to meet the different levels of management needs. Government revenue is divided into tax revenue, revenue from social insurance funds, non-tax revenue, principle recovery income from loan re-lending, debt revenue and transfer income. Tax revenue is divided into 21 sections, revenue from social insurance funds into 6 sections, non-tax revenue into 8 sections, principle recovery income from loan re-lending into 4 sections, debt revenue into 2 sections, and transfer income into 10 sections.

Class	Section
Tax Revenue	Value-added tax, consumption tax, business tax, corporate income tax, returned tax of corporate income tax, individual income tax, resources tax, fixed assets investment orientation regulation tax, urban maintenance and construction tax, property tax, stamp tax, urban land use tax, land value increment tax, vehicle use and license tax, tonnage tax, vehicle purchase tax, tariff, farmland occupation tax, deed tax, other tax revenues
Revenue of social insurance funds	Basic pension insurance fund income, unemployment insurance fund income, basic medical insurance fund income, work injury insurance fund income, maternity insurance fund income, other social insurance fund income
Non-tax revenue	Government fund income, special income, lottery fund income, administrative fees income, fines income, state-owned capital operating income, state-owned resources (assets) paid use income and other income
Principle recovery for loan re-lending	Domestic principal recovery for loans, foreign principal recovery for loans, domestic principle recovery for loan re-lending, foreign principle recovery for loan re-lending
Debt revenue	Domestic debt revenue and foreign debt revenue
Transfer income	Return income, financial transfer income, special transfer payment income, government fund transfer income, lottery public welfare fund transfer income, extra-budgetary transfer income, income balance from the previous year, and transferred fund

#### Table 4 Budget revenue item settings

### 3.3.2 Classification of expenditure functions

The classification of expenditure functions mainly reflects the different roles and policy objectives of the government's functional activities, and explains what the government has done. Government expenditure functions are divided into class, section and item. Class reflects the comprehensive functions of the government; section reflects the work needed to complete government functions; item refers to the specific expenditure spent to complete a particular aspect of the work. Items of these three levels are set up in a sequence from large to

small, from coarse to fine, and in a hierarchical way. Based on functions, general public budget expenditure is divided into 17 classes, over 170 sections and more than 800 items, which include expenditure on general public service, foreign affairs, public safety, national defense, agriculture, environmental protection, education, science and technology, culture, health, sports, social security, employment and others.

# 4. Statistics and assessment of climate public expenditure in Hebei

## 4.1 The determination of the scope of climate public expenditure in Hebei

Climate public spending is broadly categorized into three areas for further analysis as indicated below:

### 4.1.1 Expenditure on climate change mitigation

- Energy restructuring: support to renewable energy, clean coal technology and nuclear power.
- Industrial restructuring: elimination of backward steel production capacity; development of special funds for strategic emerging industries; support for technological upgrading and structural adjustment projects for traditional industries.
- Energy saving and efficiency improvement: expenditures to promote energy saving, the comprehensive utilization of resources and ecological construction.
- Development of emissions trading: the technical and transactional work of the major pollutant emissions trading in the province, the construction, management and maintenance of the province's emissions trading network and platform and related services provided to emissions trading activities.

### 4.1.2 Expenditure on tackling climate change

- Agriculture: expenditures on the protection, restoration and utilization of agricultural resources, disaster prevention and reduction and grassland vegetation restoration.
- Water conservancy: expenditures on the management and protection of water resource conservation and and water conservancy construction.
- Meteorology: expenditures on climate change monitoring, forecasting and assessment.
- Urban infrastructure construction: expenditures on urban sewage treatment facilities and the construction of supporting pipe networks, the sustainable treatment of urban garbage and the construction of supporting facilities, energy-saving building materials and the greening of urban planning areas.

### 4.1.3 Expenditure on climate capacity building

- Institution and personnel: operation and expenditure of public climate sectors and agencies; expenditure on the establishment of an expert pool for the environmental protection fund in Hebei.
- Research and development expenditure
- Expenditure on environmental publicity and education

## 4.2 Statistics on climate public expenditure in Hebei

### 4.2.1 Basic research ideas

To acquire information on the specific practices used in producing climate statistics, this report plans to refer to the approach adopted by the first phase of CPEIR. Based on the actual situation in Hebei, this report then plans to use government revenue and expenditure classifications as our primary research method, while simultaneously screening for specific expenditure items. To begin, this report intends to search for climate-related budget items according to government revenue and expenditure classifications, and then make detailed classifications by combining the expenditure items under various subjects and referring to climate correlation.

### 4.2.2 Classification of provincial public expenditure on its climate relevance

Based on classification methodology provided by the United Nations Development Program (UNDP) and adopted in many other developing countries in the Asia-Pacific region, and within the context of the current revenue and expenditure classification in Hebei (class, section and item), this report divided the fiscal expenditures based on climate correlation.

(1) High correlation: the primary objective of expenditure is directly related to tackling climate change, including environmental monitoring and supervision, pollution prevention and control, natural ecological protection, natural forest protection, returning farmland to forests, sandstorm management, returning grazing land to grassland, energy conservation, pollution discharge reduction, renewable energy and the comprehensive utilization of resources under energy saving and environmental protection; natural disaster relief under social security; disease prevention and control, response to public health emergencies, basic public health services, and major public health special projects under public health; disaster relief and protection and utilization of agricultural resources under agriculture; forestry; disaster prevention and reduction and other expenditures.

(2) Moderate correlation: the secondary targets of expenditures are related to tackling climate change, including expenditures on water conservancy and the South-to-North Water Diversion under agriculture, forestry and water resources; energy management affairs under energy conservation and environmental protection; development and reform affairs, and environmental protection and management affairs under general public services; basic research

under science and technology expenditure; expenditures for emergency treatment agencies, other professional public health institutions and maternal and child health care institutions under public health; expenditures on the planning and protection of key national scenic areas, planning and management of urban and rural communities, facilities of urban and rural communities under urban and rural communities; railway expenditure under transportation and other expenditures.

(3) Low correlation: includes or involves expenditures related to tackling climate change, such as financial affairs and statistical information affairs under general public services; science and technology management affairs, applied research, scientific and technical conditions and services, and the popularization of science and technology under science and technology expenditure; urban and rural communities management under urban and rural communities expenditure; expenditures on agricultural administrative operation and poverty alleviation in agriculture, forestry and water resources; highway and waterway transportation under transportation; public security organs under public security expenditure.

(4) No correlation: includes expenditures which have no direct connection with tackling climate change, such as the expenditures on the people's congress affairs, People's Political Consultative Conference affairs, human resources affairs and national defense under the general public services. Here, no correlation also includes unclassifiable expenses such as spending on education, culture, sports and media.

NO.	Item	High Correlation	Moderate Correlation	Low Correlation	No Correlation
1	General public services expenditure				
2	National defense expenditure				
3	Public security expenditure				
4	Education expenditure				
5	Science and technology expenditure				
6	Culture, sports and media expenditure				
7	Social security and employment expenditure				
8	Health care expenditure				
9	Energy saving and environmental protection expenditure				
10	Urban and rural communities expenditure				
11	Agriculture, forestry and water resources expenditure				

#### Table 5 Climate relevance of provincial general public budget expenditure (abridged)

12	Transportation expenditure		
13	Resource exploration information expenditure		 
14	Commercial and services expenditure		
15	Fiscal expenditure		
16	Aid to other areas		
17	Land resources, marine and meteorology and other expenditure	 	
18	Housing security expenditure		
19	Cereal and oil reserve expenditure		
20	Preparation fees		
21	Other expenditures		

According to the abridged table above, energy saving and environmental protection expenditures and agriculture, forestry and water resources expenditures have high correlation with climate change. Taking these two as cases, this report conducted an analysis on government spending at different levels.



Figure 6 Expenditure on energy saving and environmental protection at all government levels in Hebei from 2011-2015 (10,000 RMB)



Figure 7 Expenditure on agriculture, forestry and water resources at all government levels in Hebei from 2011-2015 (10,000 RMB)

Figure 6 and Figure 7 show that in the expenditures on energy saving and environmental protection and agriculture, forestry and water resources, county governments have invested the most, followed by municipal government. Village and town governments, as well as provincial governments, have invested proportionately less.

This report has classified the general public budget expenditure of Hebei, according to its climate relevance (refer to ANNEX IV).

### 4.2.3 Statistical results and analysis

According to the correlation analysis of climate expenditures, the proportion of expenditure with high climate correlation in Hebei in total public spending of Hebei between 2001 and 2015 was 4.78%, 4.69%, 5.49%, 6.02% and 6.93%, respectively. The proportion of climate expenditures with moderate cliamte correlation in the provincial fiscal expenditure was 4.34%, 4.06%, 4.02%, 4.44% and 4.35%, respectively. The proportion of climate expenditures with both high climate and moderate correlation was 8.23%, 8.75%, 9.51%, 10.46% and 11.29%, respectively. See Figure 7 for details. The data shows that Hebei attaches great importance to climate change. During the 12<sup>th</sup> FYP period, climate public expenditure increased year over year. From the perspective of the proportion of climate public expenditure in total provincial fiscal expenditure, the proportion is higher than the central climate-related expenditure of the same range. According to the statistical analysis of the first phase, the proportion of climate expenditures with high and moderate correlation at the central level was 7.6% and 6.9% in 2013-2014<sup>30</sup>.

Fiscal spending, which is highly relevant to climate, is on the rise; expenditures of moderate climate correlation rose from 3.44% in 2011 to 4.35% in 2015; expenditures of low climate correlation are declining (see Figure 8 for details).

<sup>30.</sup> Report on Climate Public Expenditure and Institutional Review in China, CAFS, 2015



Figure 8 Changes in the proportion of fiscal expenditure in Hebei by climate correlation

According to the above-mentioned proportion of climate-related expenditures, the size of expenditures on an annual basis can be obtained. Based on the calculation, expenditures with high climate correlation in Hebei between 2011 and 2015 were RMB16.92 billion (US\$2.64 billion), RMB19.145 billion (US\$5.64 billion), RMB24.225 billion (US\$3.79 billion), RMB28.155 billion (US\$4.40 billion), and RMB39.05 billion (US\$6.10 billion), respectively. Data shows that during the 12<sup>th</sup> FYP period, climate-related expenditures in Hebei increased year over year. Expenditures with high climate correlation in 2015 increased by 38.7% over the previous year, mainly due to greater investment in energy saving, environmental protection and other measures (see Figure 9 and Figure 10 for details).



Figure 9 Climate public expenditure in Hebei between 2011-2015

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Figure 10 Proportion of climate-related expenditure in GDP of the corresponding year in Hebei between 2011-2015

As shown in Figure 9, among the general public expenditure in Hebei, the size of climate-related fiscal expenditures is on the rise. As shown in Figure 10, the proportion of expenditure with high or moderate climate correlation to the GDP of the corresponding year in Hebei demonstrates an upward trend, while expenditures with low climate correlation are following a downward trend. The primary reason for this phenomenon is that Hebei has made reasonable adjustments to their climate-related fiscal expenditures, investing more fiscal funds in areas with high correlation to climate change, and enhancing the pertinence and efficiency of fund use.

According to the degree of climate correlation, and combined with the specific fiscal expenditure situation in Hebei, it is important to weight the high, low and moderate correlations, and conduct more accurate analysis on climate related expenditures (Table 6). Based on each climate correlation's respective assignment scheme, the total proportion of climate public expenditure in fiscal expenditure in Hebei is calculated (Table 7). The results show that in 2015, the proportion of climate public expenditure within the total fiscal expenditure in Hebei is 12.09% at the most optimistic estimation, and 8.44% at the most conservative estimation.

Assignment Scheme	High Correlation	Moderate Correlation	Low Correlation
Scheme 1	100%	70%	30%
Scheme 2	100%	50%	20%
Scheme 3	80%	50%	20%
Scheme 4	70%	50%	20%
Scheme 5	90%	50%	20%

#### Table 6 Weighting schemes<sup>31</sup>

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<sup>31.</sup> The above percentage has a certain degree of simulation. As it is impossible for further breakdown and statistical analysis on climate public expenditure from open source, based on the relevant national statistical experience and the differences among expenditures in terms of climate correlation, make predictions on the proportion of climate expenditure. As shown in Scheme 1, it is assumed that for the fiscal expenditure with high climate correlation, 100% of the fiscal expenditure is used to cope with climate change, and 70% for expenditures with moderate climate correlation and 30% for expenditures with low climate correlation. So are other schemes.

Assignment Scheme	2011	2012	2013	2014	2015
Scheme 1	11.69%	11.85%	11.26%	12.08%	12.09%
Scheme 2	9.50%	9.60%	9.47%	10.21%	10.52%
Scheme 3	8.55%	8.66%	8.37%	9.01%	9.13%
Scheme 4	8.07%	8.20%	7.82%	8.40%	8.44%
Scheme 5	9.03%	9.13%	8.92%	9.61%	9.82%

# Table 7 Analysis of the proportion of climate-related expenditure in fiscal expenditure in different schemes

### 4.2.4 Further reflection on existing analytical methods

This report believes that there is room for further improvement in the existing analytical methods, and that the criteria of correlation assessment needs to be further adjusted. For example, when this report defines the climate correlation of an activity by the criteria of climate change mitigation and climate change adaption, the results will be different; such results will affect the statistics of relevant fiscal funds.

The two main aspects of addressing climate change are mitigation (reducing greenhouse gas emissions) and adaptation (recognizing climate change and establishing mechanisms to strengthen resilience). Both developed and developing countries must adopt "measurable, reportable and verifiable" mitigation actions. Mitigation measures are aimed at addressing the causes of climate change, while adaption focuses on addressing the impact of climate change. Adaptation refers to the adoption of policies and practices to address the impacts of climate change. Different sectors have different adaptation measures, such as increasing water resources by expanding rainwater collection, water storage and water conservation, bolstering agricultural production by adjusting planting dates, crop varieties and engaging in crop relocation, increasing infrastructure construction (including in coastal areas) by establishing wetlands as barriers against sea level rise and flooding, optimizing energy utilization by using renewable energy and improving energy efficiency.

According to the definition of climate change mitigation and adaptation, combined with the practices of Hebei in China, this report re-assessed the climate correlations of the relevant budget expenditure items (see Annex V, table 1, 2 and 3 for details).

The re-assessment results show: in the case of high correlation, the number of climate change mitigation items accounts for 36% of the total number of items, the number of tackling climate change items accounts for 25%, while the number of items with both correlations accounts for 39%; in terms of moderate correlation, the number of climate change mitigation items accounts for 19% of the total number of items, the number of tackling climate change items accounts for 42%, while the number of items with both correlations accounts for 38%; in the area of low correlation, the number of climate change mitigation items accounts for 20% of the total number of items accounts for 38%; in the area of low correlation, the number of tackling climate change items accounts for 36%, while the number of items with both correlations accounts for 36%, while the number of items with both correlations accounts for 36%, while the number of items with both correlations accounts for 36%, while the number of items with both correlations accounts for 36%.



Figure 11 Re-classification results of general public budget expenditure items according to climate correlation

Taking the 2015 general public expenditure in Hebei as an example, based on the re-classified climate correlation standards, re-calculation was conducted. The results show that in the case of high correlation, the overlapping amount of mitigation and adaptation accounts for 21.19% of the expenditure; in the case of moderate correlation, the overlapping amount of mitigation and adaptation accounts for 20.02% of the expenditure; in the case of low correlation, the overlapping amount of mitigation and adaptation accounts for 56.06% of the expenditure (see Table 8 for details). Analysis of the specific items indicates that the overlapping parts are mostly a result of institutional operating expenditures, research and development expenditures and publicity spending. These activities share the functions of mitigation and adaptation. Refer to Table 9 and 10 for the proportion of the climate public expenditure, according to the reclassified statistics, in the general public expenditure and GDP of the corresponding year.

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	Mitigation	Adaptation	Mitigation & Adaptation	Percentage of Overlapping (%)
High Correlation	33.661	13.667	8.273	21.19%
Moderate Correlation	20.95	8.485	4.911	20.02%
Low Correlation	44.524	33.52	28.044	56.06%

#### Table 8 Statistics of climate-related expenditure in Hebei in 2015 after reclassification

Unit: Billion Vuan

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	Mitigation		Mitigation & Adaptation	
High Correlation	5.98%	2.43%	1.47%	
Moderate Correlation	3.72%	1.51%	0.87%	
Low Correlation	7.91%	5.95%	4.98%	

# Table 9 Proportion of the climate public expenditure in the general public expenditure of the<br/>corresponding year in Hebei after the reclassification

# Table 10 Proportion of the climate public expenditure in the GDP of the corresponding year inHebei after the reclassification

	Mitigation	Adaptation	Mitigation & Adaptation
High Correlation	1.13%	0.46%	0.28%
Moderate Correlation	0.70%	0.28%	0.16%
Low Correlation	1.49%	1.12%	0.94%

The above statistical analysis shows that more than half of the expenditure items with high, moderate and low correlation can be subdivided again based on the definition of climate change mitigation and adaptation. After the re-classification, the amount of fiscal expenditure used to tackle climate change can be calculated more accurately.

# **5. Key Conclusions and Recommendations**

# 5.1 Key Conclusions

# 5.1.1 With increasing importance being attached to climate change, climate public expenditures have grown year over year.

Since the 18<sup>th</sup> National Congress of the CPC, China has always seen the development of an ecological civilization as an important strategy for the governance of the country. The Third Plenum of the 18<sup>th</sup> National Congress of the CPC proposed to accelerate the development of systematic and complete ecological civilization systems; the Fourth Plenum required that stringent legal systems be adopted to protect the ecological environment; and the Fifth Plenum introduced green development as a new development concept. Hebei has also attached great importance to climate change. A review of the province's climate public expenditures shows that its expenditures have been growing year over year throughout the 12<sup>th</sup> FYP period. After 2015, with increased investment in energy conservation and environmental protection, Hebei's public expenditures highly relevant to climate change grew by 38.7% over the previous year. Public expenditures highly or moderately relevant to climate change has been on the rise during the period of 2011-2015, with the share of such expenditure within the province's total expenditure having increased from 8.23% to 11.29%. This proportion is even higher than that of the central level within a the same statistical scope.

# 5.1.2 Climate change finance is characterized by multiple sources of funding, diversified methods of investment and extensive areas of investment.

The CPEIR of Hebei indicates that the province's financial contribution to addressing climate change is derived from many sources, including the government, capital markets and international loans. Apart from the general public expenditure, fiscal input from the government also includes state-owned capital and government-owned expenditure. The government has explored the use of market-oriented instruments (e.g., emissions trading) and financial instruments (e.g., green securities) to support emerging industries, environmentally-friendly industries and low-carbon industries; they have also explored the provision of special funds and the replacement of subsidies with incentives. Fiscal investment covers both climate change mitigation and adaptation. The measures to mitigate climate change have shifted from ex-post coping to prevention and control of effluents at the source. Adaption measures cover the setup and functional adjustment of administrative organizations, and advocacy for and changes in human health, lifestyle, travel means and production modes.

# 5.1.3 The improvement of climate public expenditure budget system provides institutional guarantees for enhancing the efficiency of fund uses and for strengthening fund supervision.

The budget of a government reflects the scope of the government's activities, as well as the policies to be achieved by the government over a particular period; the budget system is a safeguard for the government to attain its policy goals. As the reform of budget management systems deepens, the budget items for climate change public expenditure have been improving. In 2015, for example, "energy conservation and environment protection" was added to the government's list of budget expenditure items, and items highly relevant to measures that reflect and address climate change were added to the fiscal budget; a full coverage budget management system has also been preliminarily established to serve as a coordination and integration mechanism for the budget of government-managed funds, the budget of stateowned capital operations, the budget of social insurance funds and that of the general public budget. Moreover, efforts have been exerted to enhance the coordination of funds from governments at or above the local level, and to incorporate off-budget funds into the budget to improve the transparency of fund uses and facilitate better supervision. Budget control has also been improved. For example, medium-term fiscal plan management and the intertemporal budget balance mechanism have enhanced the integration of budgeting and planning, thus improving the appropriation and utilization of fiscal funds, reducing the size of idle fiscal funds and contributing to the efficiency of fund uses.

# 5.1.4 The statistical and evaluation methods for climate public expenditure have been expanded.

In the first stage of CPEIR, public spending was statistically analyzed by category in light of the relevance of such funds to climate change activities; this was done in order to evaluate the scale of climate change public expenditures at the central government level. In the second stage, however, this report has expanded the categorization and statistical analysis methods



for climate public expenditure. This report further broke down provincial expenditures into those for climate change mitigation and those for adaption. It found that this subdivision-based statistical analysis method gathered more precise data on the expenditures directed to address climate change, thus laying a foundation for an accurate cost-benefit analysis and performance appraisal of public expenditures in general.

## **5.2 Recommendations**

# 5.2.1 To address climate change requires an enhancement of the dissemination of concepts and top-level policy designs to foster virtuous interactions between the government and the market.

At the national level of governance, development concepts such as the "lucid waters and lush mountains are invaluable assets"<sup>32</sup>, "we need not only lucid waters and lush mountains, but also gold and silver mines" and "we'd rather have lucid waters and lush mountains than have gold and silver mines" have been reiterated again and again. At the operational level, despite decrease in tax revenue and econmoic downturns due to the lack of alternative drivers of growth, Hebei has exerted certain supervision of negative measures that fuel climate change. Moreover, they resort to administrative means to do so, while respecting market principles. In policy design, therefore, there is a need to clarify concepts, heed the development of top-level institutions and use systematic thinking to guide climate change activities. Governments must use market-oriented means more consistently to address climate change. Moreover, measures such as raising the entry threshold for industries, imposing taxes and levying charges can be adopted to internalize the cost of pollution of enterprises and increase their cost, thereby removing their incentive to continue the exploitive development path. In addition, by using the laws of pricing, governments can increase their purchase of energy-saving and consumptionreducing products to impact market demand and in turn promote the transformation and upgrading of production.

# 5.2.2 There is a need to deepen the reform in budget management systems in order to improve the effectiveness of policies and funds.

To address climate change, Hebei has increased public spending and made mang efforts to explore ways to increase its effectiveness. It is suggested that budget management system is further improved. On the one hand, fiscal budget management must introduce the "medium-term" concept and practice medium-term fiscal plan management in order to make the budgetary arrangement align with the medium-to-long-term policies of the government, shift governmental decisions on climate change activities from annual ones to more forward-looking and continuous medium-term ones, and ensure that current policies support the long-term sustainability of public finance. On the other hand, there is the need to practice whole process budget performance management, improve the quality of performance information

<sup>32.</sup> http://www.cctb.net/bygz/zywxsy/201511/t20151113\_331161.htm

and integrate performance management with appraisal results and budgetary arrangement. In creating budgets, there is the need to set performance goals and establish standardized performance indicator systems. Quantitative performance indicators should include not only such indicators as the quantity, quality, timing and cost of output, but also such indicators as the economic, social and ecological benefits, the impact on sustainability and the satisfaction of service recipients. Finally, there is a need to conduct performance appraisals on climate public expenditure policies, prepare performance appraisal reports for such policies and disclose them to the general public.

# 5.2.3 The methods of fiscal expenditure need to be further innovated to establish market-oriented restraint mechanisms.

To address climate change is an arduous task. The result indicates that the climate related public spending has been growing in Hebei in recent years. Meanwhile, greater attention has been given to reform innovative spending modalities and improve cost-effectiveness. However, in contrast to the enormous financial demand, fiscal funds may be far from enough to tackle climate change. In addition to widening channels of financial input, there is also the need to innovate, to enhance the integration of public finance with the use of financial instruments (e.g., funds, bonds), and to enhance the leverage capacity of fiscal funds. For example, the government may attract social capital into climate change activities by way of PPP models, fiscally subsidized interest rates and green finance. Moreover, the government may use market-oriented means (e.g., emissions trading) and financial instruments (e.g., green bonds) to support the development of emerging, environment-friendly and low carbon industries.

# 5.2.4 Research on the cost-benefit analysis for climate public expenditure needs to be enhanced.

The review of climate public expenditure is a new area of research. In addition to establishing scientific categorization and statistical analysis methods to evaluate the total size and structure of climate public expenditure, there is also the need to conduct comprehensive cost-benefit analysis for such expenditure; such analysis is to identify the cost to all stakeholders involved in tackling climate change and the eco-environmental, social and economic benefits of climate public expenditure, thereby providing a basis for improving climate public expenditure policies.

# **Report II:**

Cost-Benefit Analysis of Climate Public Expenditure

——A Case Study on Overcapacity Reduction in Hebei Province

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# Introduction

Climate change is closely linked to a country's mode of economic development. Facilitating the transformation of an economic development mode towards low-carbon development is necessary to deal with climate change. At present, China is pushing forward supply-side structural reform, overcapacity reduction being an important part of such reform. Existing overcapacity, which is a result of extensive development in the past, has not only increased the pressures of the present economic downturn, but also resulted in a number of defects in environmental protection that could bring an end to China's sustainability efforts. As an important measure for dealing with climate change, overcapacity reduction would optimize the production structure, improve the efficiency of resource utilization, reduce industrial emissions and improve the quality of economic development.

Hebei Province has been typical in its response to climate change. It is a big industrial province; the province's GDP in 2016 reached RMB3.18 trillion (US\$497.31 billion), with the added value of secondary industries being RMB1.51 trillion (US\$235.24 billion). These numbers accounted for 47.3% of the GDP and were 7.5% higher than the national level. Industry occupies an important position in the economy of Hebei. Hebei is a big producer of iron and steel. In 2016, the output of pig iron was 183.94 million tons, the output of crude steel was 192.60 million tons, and the output of steel products was 261.504 million tons. The output of iron and steel accounted for 1/4 of the total output of the whole country. In recent years, Hebei has actively responded to climate change, consistently increasing climate-related public expenditures, and notable results have been achieved.

Building on the CPEIR in Hebei, this report includes cost-benefit analysis on specific projects of public expenditure concerning climate change. The aim is to explore the methodological framework of climate public expenditure performance review. In view of the fact that overcapacity reduction has been one of the important measures to deal with climate change in Hebei over recent years, this report has selected the project of overcapacity reduction in Hebei to conduct the research. Taking into account our field visits and investigations of relevant governmental departments and enterprises in Hebei, this report has conducted a relatively systematic analysis of the costs and benefits of overcapacity reduction, and explored the construction of a methodological framework for cost-benefit analysis on climate public expenditure.

# 1. Progress made in overcapacity reduction in Hebei

In September 2013, President Xi Jinping delivered a speech on resolving excess capacity, and commissioned Hebei to be leader in this effort. In 2013, Hebei formulated and implemented its Implementation Plan on Resolving Serious Production Overcapacity Conflicts, which put forward the "6643 Program" to resolve overcapacity. By 2017, according to the "6643 Program", the production capacity related to the production of 60 million tons of steel, 60 million tons of cement, 40 million tons standard coal and 30 million standard-weight cases of flat glass will be reduced. The plan has been effectively implemented in all respects, and some industries have surpassed their targets.

## 1.1 General information about overcapacity reduction in industries in Hebei

Hebei is a big industrial province. The outputs of its industrial products take up very high proportions of the total outputs of the whole country. The proportions of major industrial products in 2012 are shown in Table 11. Except for cement and glass, which take up relatively small proportions, the outputs of iron and steel products account for more than 20% of the total outputs of the whole country.

	Crude Steel (10,000 tons)	Steel (10,000 tons)	Pig Iron (10,000 tons)	Cement (10,000 tons)	Glass (10,000 weight cases)
Whole country	72388.2	95577.8	66354.4	220984.1	75050.5
Hebei	18048.4	20995.2	16350.2	12809.8	11382.7
Proportion	24.93%	21.97%	24.64%	5.80%	15.17%

#### Table 11 Outputs of relevant industrial products in Hebei and their proportions in 2012

Source: National Bureau of Statistics, Hebei Provincial Bureau of Statistics

## 1.2 Current developments in overcapacity reduction in Hebei

Such large proportions have translated into increased pressure in the area of overcapacity reduction in Hebei. For example, in 2014 overcapacity reduction in the steel, iron, cement and flat glass industries accounted for 55.56%, 55.56%, 93.29% and 72.37% of the planned tasks for the whole country, respectively<sup>33</sup>. The Hebei provincial government has attached great importance to overcapacity reduction and has attained satisfactory results.

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<sup>33.</sup> Source: Website of State Council Information Office.



Figure 12 Completion of overcapacity reduction tasks in Hebei 2013-2016

As shown in Figure 12, despite some fluctuations, the average number of overcapacity reductions between 2013 and 2016 in major products remained above 1,000 units annually. The work done in 2014 was especially remarkable. In that year, the production capacities of cement and flat glass were reduced by 39.18 million tons and 25.33 million weight cases respectively, which reduced the pressures associated with the remaining overcapacity reduction tasks and significantly accelerated the adjustment in capacity layout.

During the 12<sup>th</sup> FYP period, Hebei reduced 33.91 million tons of iron production capacity, 41.06 million tons of steel production capacity, 138.34 million tons of cement production capacity, and 72.025 million weight cases of flat glass<sup>34</sup> respectively, achieving 68.43%, 56.51%, 230.57% and 240.08% of the original targets set out in the "6643 Program". Overcapacity reduction in cement and flat glass has already exceeded its stated goals. The reductions in steel and iron production capacities accounted for 37.26% and 43.31% of the national reductions over the same period, and were higher than the percentages of Hebei in the total outputs. Although economic growth in 2014 dropped by 1.7% year over year, the economic growth rate stayed around 6.8% over the past three years, similar to that of the remainder of the country. This means that the economic development in Hebei has been relatively stable, and without slumps. The registered unemployment in urban areas in 2016 was 3.68%, 0.34% lower than the overall level of the rest of the country. The overcapacity reduction tasks have been largely fulfilled in a satisfactory manner without large-scale unemployment or regional systematic risks.

<sup>34.</sup> http://www.hbdrc.gov.cn/web/web/xwbd/4028818b555274660155d76169f978f6.htm

## 1.3 Future plan for overcapacity reduction in Hebei

During the 13<sup>th</sup> FYP period, Hebei Province will continue to undertake 1/3 of the national reduction of iron and steel production capacity targets. According to the plan, from 2016 to 2017, 37.15 million tons of iron production capacity and 31.77 million tons of steel production capacity will be reduced. During the 13<sup>th</sup> FYP period, 49.89 million tons of iron production capacity and 49.13 million tons of steel production capacity will be reduced<sup>35</sup>. By the end of the 13<sup>th</sup> FYP period, the production capacities of iron, steel, cement and flat glass will be around 200 million tons, 200 million tons and 200 million weight cases, respectively.

# 2. Analysis of cost of overcapacity reduction

Overcapacity reduction, or resolving overcapacity, refers to methods applied to transform and upgrade production facilities and products so as to reverse situations in which an industry or business cannot sell as much as it produces. Overcapacity is a example of mismatched resources, where a large amount of valuable social resources are consumed in an industry with overcapacity, but fail to be fully utilized. However, overcapacity reduction is not just eliminating backward production capacity. It also concerns efforts to improve and optimize the industrial structure. Through changes in industrial production modes, overcapacity reduction is a response to the shift from an extensive economy to a circular economy, the need to reduce industrial waste pollution and damage to the environment, and the necessity of lowering negative human impacts on the climate. For Hebei, overcapacity reduction is an important part of the construction of an ecological civilization and is important for improving the living environment for the residents of the province. To achieve the goals of overcapacity reduction, governments at all levels, enterprises and other relevant stakeholders, should bear responsibility, and thus optimize and orient their functions relative to the reduction goals and invest heavily in the process of achieving such goals.

# 2.1 Theoretical framework for cost analysis of overcapacity reduction

To comprehensively estimate and calculate the cost of overcapacity reduction, efforts should be made to have a clear understanding of the connotation, external features, form of expression and cost range of overcapacity reduction; it is also necessary to conduct cost statistic analysis and calculation in a comprehensive way, based on the actions and measures taken by the government and relevant enterprises during the process of overcapacity reduction.

### 2.1.1 Understanding the multiple dimensions of the cost of overcapacity reduction

In accounting, cost has different definitions relative to its application. The definition of "cost" given by American Accounting Association (AAA)'s committee on cost and standard is the value

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<sup>35.</sup> http://www.hbdrc.gov.cn/web/web/xwbd/4028818b55144edf015542058f042a8c.htm

sacrificed measured by the currency that has taken place or has not taken place for a specific purpose. The definition of "cost" in Article 2.1.2 of the *CCA2101 : 2005 Cost Management System – Terms*, published by the China Cost Association (CCA) is: the resource<sup>36</sup> price paid or to be paid for the purpose of process incrementation or result effectiveness.

The problem of cost is, in a sense, a correlative and systematic problem. Certain expenditures, as a part of the total costs of overcapacity reduction, have the features of lagging and latency (For example, overcapacity reduction may result in rise in social and financial risks; to maintain a smooth operation of the economy, the fiscal authorities should account for these risks). From the accounting point of view alone, long-term invisible costs will be easily ignored, resulting in incomplete statistical results.

This report holds that the research and calculation of the cost of overcapacity reduction must be based on a theoretical basis involving inputs from economics, management and sociology. The cost of overcapacity reduction includes not only visible and measurable funding costs, but also institutional transition costs (Liu Shangxi, 2016). This report may only obtain a scientific and comprehensive view of the costs of overcapacity reduction by examining it from a variety of perspectives and dimensions, such as changes in production mode, economic and social transformation and a global perspective. Hence, the cost of overcapacity reduction defined in this report may be divided into visible cost, invisible cost and opportunity cost.

The visible cost of overcapacity reduction refers to its direct and present cost during the process, which is characterized by one-off and static natures. A "one-off" nature means that the form of funding is characterized by obvious stages. The specific scope of a one-off cost is relative clear and easy to calculate, such as the inputs in infrastructure and staff resettlement; A "static" nature means that the cost at a certain price is calculated by a certain time point.

Invisible costs refer to expenditures that are neither direct nor present during the process of overcapacity reduction, and which are characterized by frequent and dynamic natures. A "frequent" nature is the operational and maintenance cost associated with infrastructure, and also the costs linked with social management. It has a distinctive feature, namely, a rigid expenditure, and the calculation of its specific scope and amount is dynamic. Due to this "dynamic" nature, this report should, while calculating the cost, take into account any price changes within the period of time in question, including changes in overall overcapacity reduction processes such as labor costs, basic construction material prices and any changes in public service costs. Practically speaking, the "dynamic" cost of overcapacity reduction in China shows a strong rising trend.

Opportunity cost refers to the value of an alternative option during the course of overcapacity reduction. It may also be understood as the value of all abandoned choices when this report chooses from any one of several programs.

<sup>36.</sup> It means all substances that may be utilized by human. The resources in an organization generally includes: human resource, material resource, financial resource and information resource, etc.

Overcapacity reduction is a systematic process. It requires both cooperation from market players and appropriate interventions from the government.

### 2.1.2 The government's cost of overcapacity reduction

From a governmental perspective, the cost of overcapacity reduction includes both visible and measurable funding costs and institutional transition costs. For the government, overcapacity reduction itself contains comprehensive requirements for development, reform and transformation. It covers all changes in production modes, and its core purpose is to optimize the allocation of resources and facilitate smoothly all such production mode changes. Therefore, the process of overcapacity reduction cannot succeed without corresponding changes in development concepts and a deepening of the various institutional reforms which include changes in economic development modes and strategies for the protection of the environment.

The visible cost of overcapacity reduction to the government includes, but is not limited to, government expenditures on establishing financial incentives to encourage the elimination of background production capacities; expenditures to cover additional staff resettlements to prevent the social risks incurred by overcapacity reduction in enterprises; expenditures on establishing project information databases and disclosure systems so as to better grasp the progress of overcapacity reduction and ensure the process is open and transparent; social management costs incurred during the process of overcapacity reduction – the aim of such expenses is to reduce damage to the environment by lowering waste emissions from enterprises, effectively respond to climate change and monitor in real-time enterprise waste emissions (Hebei has established the only environmental protection law enforcement team in the whole country); and industrial transition costs associated with urban planning and enterprise resettlement.

The invisible costs of overcapacity reduction to the government include preferential taxes provided to enterprises reducing overcapacity. During the process of overcapacity reduction, any decision by the financial system to tighten management over lending operations in specific industries may cause economic risks, social risks, financial risks and other invisible risks such as capital chain ruptures and bankruptcies. Social risks and financial risks will also rise due to large amounts of unemployment and a rise in non-performing social asset ratios. The consequences cannot be discerned within short periods of time. When such risks take place, fiscal authorities will have to cover these costs, which are invisible expenditures.

The opportunity cost for the government in the process of overcapacity reduction includes the fact that, during such a process, the elimination of backward industries and the optimization and upgrading of growing industries will end up resulting in more inputs and fewer profits for enterprises, which will in turn lead to lower tax revenues of the government.

The main costs incurred by governments at various levels during the process of overcapacity reduction are shown in Figure 13.



Figure 13 The government's cost of overcapacity reduction

### 2.1.3 Enterprises' cost of overcapacity reduction

During the process of overcapacity reduction, enterprises acting as micro players in the market will incur a range of outcomes. Some enterprises will need to be completely shut down, while others will only need to be partially shut down. For enterprises, visible costs refer to the direct and present expenditures incurred during overcapacity reduction. Some of these enterprises cannot meet the production, technology, environmental protection and quality requirements, and are thus shut down by the government due to their incapacity to limit the amount they pollute. In larger enterprises, although closed-loop production has been developed, some processes are still in need of upgrading. These enterprises continue with their operations, but will have their inefficient production capacities eventually compressed and eliminated. During this process, problems concerning staff resettlement, debt disposal and the losses from asset devaluation will occur. Through mergers, reorganizations and relocations, some of the enterprises that are shut down give play to the agglomeration effect, and thus accelerate the transformation and upgrading of their production operations. During this process, enterprises achieve industrial upgrading by investing in scientific research and technology; in order to reduce the negative impacts of industrial waste, such enterprises invest in cleaning equipment to effectively treat waste before discharge.

Invisible costs refer to the indirect and non-current expenditures incurred during overcapacity reduction. For example, enterprises who struggle with overcapacity due to inefficient production capacities incur increased lending costs due to their being downgraded in terms of their credit standing. Overcapacity reduction results in the breaking of chains in the circular economy during production, thus requiring that some of the raw materials be purchased from other provinces, resulting in a rise in raw material, transportation and manpower costs.

The opportunity cost for an enterprise, in the context of a response to the national overcapacity reduction policy measure, requires that enterprises cannot default to whatever plan of action will result in the highest profit; they must take into account the value of rejecting or aligning with national policy.

The various costs that enterprises incur during overcapacity reduction are shown in Figure 14.



Figure 14 Enterprises' cost of overcapacity reduction

In order to estimate and calculate the cost of overcapacity reduction in a more comprehensive way, efforts should be made to classify the cost by considering the actions and measures taken by the government and enterprises during overcapacity reduction. Based on stakeholder interests and the characteristics of their activities, this report adopted the concepts of visible cost and invisible cost and thus present the cost of overcapacity reduction in the form of a matrix. In this matrix, each stakeholder involved in overcapacity reduction constitutes the vertical axis, while the categories of cost constitute the horizontal axis (see Table 12).

	Visible Cost	Invisible Cost	Opportunity Cost
Government	<ol> <li>Public expenditure in the form of financial incentives (cascade financial incentives) and special funds (cost of staff resettlement);</li> <li>Additional management expenditure to establish project information databases and the disclosure system;</li> <li>Industrial transition cost undertaken by the government.</li> </ol>	<ol> <li>Preferential taxes</li> <li>Social security expenditure on follow-up fiscal coverage</li> <li>Local debt risks</li> </ol>	Reduction in fiscal income within a period of time due to the elimination of backward production capacity
Enterprises	<ol> <li>Cost of staff resettlement</li> <li>Expenditure on merger and reorganization</li> <li>Expenditure on relocation</li> <li>Expenditure on scientific research and development</li> <li>Transportation cost</li> <li>Raw material cost</li> </ol>	<ol> <li>Increased lending cost due to credit changes</li> <li>Increased cost caused by changes in industrial layout chains</li> <li>Entry cost</li> </ol>	When the market recovers, enterprises with compressed production capacities will lose market and profit opportunities, which will result in less revenues.
Financial System (e.g. banks)	Cost of due diligence	Potential systematic financial risks	

#### Table 12 Matrix of the cost of overcapacity reduction

### 2.2 Analysis of the government's cost of overcapacity reduction

Based on the theoretical analysis framework above, and combined with the overcapacity reduction data from Hebei, an analysis of the main costs to government has been undertaken.

### 2.2.1 Public expenditure in the form of financial incentives and special funds

To promote the reduction of overcapacity, central, provincial and municipal governments have increased investment in various ways.

The central government supports the overcapacity reduction objective of local governments through the establishment of financial incentives. On April 20, 2011, the Ministry of Finance, Ministry of Industry and Information Technology and National Energy Administration issued their *Administrative Measures for Central Financial Incentive Funds to Shut Down Outdated Production Facilities*, which provided incentives for the elimination of outdated production facilities during the 12<sup>th</sup> FYP period (2011-2015); it covered more than ten industries, including

electricity, steel, coke, alcohol, and printing and dyeing. On June 14, 2016, the Ministry of Finance issued its *Administrative Measures for Special Rewards and Subsidies for Structural Adjustments of Industrial Enterprises*. In order to encourage local and central enterprises to reduce overcapacity in coal and steel as soon as possible, special rewards and subsidies, amounting to RMB100 billion (US\$15.6 billion) were set up and provided incrementally. The amounts of the special rewards and subsidies were determined by the total size of the budget and the targets of overcapacity reduction; the special rewards and subsidies for the steel industry and the coal industry were determined by factors including the volume of overcapacity to be reduced, the number of workers to be resettled and the difficulty level in doing so. Proportionately more special rewards and subsidies will be provided to the provincial and central enterprises whom over-fulfill on their targets; funds will primarily be used to resettle displaced workers.

To alleviate the financial pressures associated with overcapacity reduction on enterprises, Hebei allocated rewards and subsidies to cities with districts and provincial counties (cities) in a timely manner. Also, 2014 witnessed the introduction of the *Measures for Rewards and Subsidies to Eliminate the Overcapacity of Iron and Steel Industry in Hebei Province*. RMB800 million (US\$125 million) (RMB600 million for the first batch of funds) of special funds for air pollution control and RMB200 million (US\$31.25 million) of special funds for the elimination of overcapacity facilities in the iron and steel industries was arranged<sup>37</sup>. According to the regulation, those that have removed blast furnaces of 450 cubic meters and above, converters of over 40 tons, electric furnaces of over 30 tons, in addition to the rewards and subsidies from the state, will be rewarded by Hebei with RMB250,000 (US\$39,000) for every 10,000 tons of iron-making capacity reduced. As of October 2016, RMB200 million (US\$31.25 million) of provincial special funds to cut iron and steel overcapacity reduced.

In November 2016, Hebei Province issued its *Measures for Rewards and Subsidies to Cut the Coal Overcapacity in Hebei Province*. Subsidies will be provided based on the amount of production capacity reduced in private coal mines. The standards are calculated using two factors: first, RMB300,000 (US\$47,000) in subsidies will be offered for every 10,000 tons of capacity reduced; second, rewards will be provided in a meritocratic way, whereby RMB2 million (US\$312,000) will be rewarded to mines with annual production capacity below 60,000 tons (including 60,000 tons), RMB2.5 million (US\$390,000) to mines with annual production capacity between 60,000 tons (excluding 60,000 tons) and 90,000 tons (including 90,000 tons), and RMB3.5 million (US\$547,000) to mines with annual production capacity above 90,000 tons (excluding 90,000 tons).

<sup>37.</sup> http://hebei.ifeng.com/news/chengshi/ts/detail\_2014\_11/05/3110479\_0.shtml

In November 2016, Hebei issued its *Guiding Opinions on Raising Funds through Multi-channels to Cut the Overcapacity of Iron and Steel Industry.* In accordance with the principles of the government and the voluntary involvement of the market, a compensation mechanism for reducing iron and steel capacity, subsidizing reduced capacity with stock capacity, and promoting the flow of iron and steel capacity to the enterprises with strong competitiveness was developed. So far, some of the cities and counties with more challenging overcapacity reduction targets have established rewards and issued subsidies for this end. For instance, Tangshan arranged RMB100 million (US\$15.6 million) in financial funds in 2017 and Handan arranged RMB130 million (US\$20.3 million) at the municipal level in 2016 to support iron and steel enterprises in their efforts to cut overcapacity.

Special funds and subsidies aim to achieve the following: allow the government to arrange a fixed proportion of the special funds for overcapacity reduction; use central special funds and local funds to support overcapacity industries undergoing capacity reduction and transformation, and offer incentives and policy support to the proportion to these enterprises who are in need of re-employing employees; provide free re-employment-related vocational skills training for laid-off workers; reallocate state-owned capital from debt restructuring to social security fund accounts to stabilize and moderately increase benefits for the unemployed.

Refer to Table 13 for the annual source of funds for overcapacity reduction from the central government and Hebei's provincial government between 2013 and 2016. As shown in the table, in recent years, overcapacity reduction funds from the central government have been increasing, and the investment volume from the central government in 2016 amounted to 15 times that of the amount in 2013; the central government is thus an important source of public investment in overcapacity reduction.

	The central Government (10,000 yuan)	Percentage in the general public expenditure at the central level (%)	Hebei Provincial Government (10,000 yuan)	Percentage in the general public expenditure at the provincial level in Hebei (%)
2013	16,656	0.008%	10,000	0.12%
2014	119,622	0.053%	106,665	1.31%
2015	113,434	0.044%	29,776	0.35%
2016	246,227	0.090%	104,658	0.30%

# Table 13 The annual sources of funds from the central government and Hebei provincialgovernment between 2013 and 2016 for overcapacity reduction

Source: Hebei Provincial Department of Finance

#### Box: The government investment in overcapacity reduction in Tangshan City, Hebei

Tangshan is located in the eastern part of Hebei. Its GDP in 2016 reached 630.62 billion yuan (US\$98.5 billion), with an average annual increase of 6.4%. The general public budget income amounts to 35.51 billion yuan (US\$5.5 billion). The iron and steel output in Tangshan accounts for 2/3 of the total volume in Hebei, leaving a heavy task for overcapacity reduction. Government support for the implementation of overcapacity reduction not only includes fund investment from the governments above the provincial level, but also increasing efforts of the government at the municipal level to integrate financial capital.

Overcapacity reduction in Tangshan aims to shut down outdated capacity facilities and at the same time promote industrial upgrading, with 1.04 billion yuan (US\$162.5 million) of integrated fund at/above the municipal level of Tangshan, focusing on support for steel, cement, coking and other industries, emission reduction projects; mobilizes 1.1 billion yuan (US\$171.9 million) at/above the municipal level to support Tangshan Best Steel Company and other enterprises to cut overcapacity in iron and steel; invests 150 million yuan (US\$23.4 million) to support the demolition of coal-fired boilers in the central area and establishment of a centralized heating grid project; mobilizes 460 million yuan (US\$71.9 million) at/above the municipal level to eliminate 62,000 heavy-polluting vehicles; purchases 515 environmental-friendly clean energy buses; invests 225 million yuan (US\$35.2 million) to support industrial development and establishes investment guidance funds and technology venture capital funds for industry, agriculture and service industry with the aim to create a resourceful integrated platform and boost industrial transformation and upgrading; and invests 750 million yuan (US\$117.2 million) to support the transformation and upgrading of industrial enterprises and drive steel equipment manufacturing industries to innovate based on existing resources.

In line with the air pollution control targets in Tangshan, the city has made comprehensive and planned use of air pollution control funds from the central, provincial and Tianjin governments. Tangshan got special funds of 1.25 billion yuan (US\$195.3 million) for air pollution control including 600 million yuan (US\$93.7 million) in 2015 and 650 million yuan (US\$101.6 million) in 2016. The funds have been mainly used for air pollution prevention and control tasks, such as to manage coal, reduce overcapacity in steel, promote new energy vehicles, and build capacity.

Increase the municipal capital investment. 1.14 billion yuan (US\$178.1 million) was arranged in 2016 in Tangshan to prevent and control air pollution, of which 480 million yuan (US\$75 million) was from 2015, and 660 million yuan (US\$103.1 million) from 2016 as subsidies for enterprises reducing overcapacity and for the closed enterprises due to overcapacity reduction, elimination of outdated capacity and air pollution. To spur overcapacity reduction, Tangshan issued measures to provide rewards and subsidies for the capacity reduction of iron and steel, stipulating a compensation of 50,000 yuan per 10,000 tons.

Source: Tangshan Municipal Bureau of Finance

#### 2.2.2 Expenditure of employment stabilization subsidies

In line with the Opinions on the Resettlement of Workers While Reducing Overcapacity in the Steel Industry to Achieve Development by Solving the Difficulties (Ministry of Human Resources and Social Security [2016] No. 32) issued by seven departments including the Ministry of Human Resources and Social Security and the National Development and Reform Commission, the General Office of Hebei Provincial Government issued its Implementing Opinions on the Resettlement of Workers from the Iron and Steel Industry Undergoing Overcapacity Reduction. It gives priority to the resettlement of workers and requests enterprises to take responsibility, organize work locally, and abide by relevant laws and regulations. It requires enterprises to take into consideration local conditions and make full use of market mechanisms and support measures for better resettlement work. They are also required to facilitate the resettlement of workers by expanding existing policies to stabilize employment; for example, they can include internal retirement and pending retirement, promote job transfers and entrepreneurship, encourage the merger and reorganization of preponderant enterprises, support people in dire need through services such as public welfare jobs, properly handle labor relations, carry out vocational training, and provide specific policy subsidies.

In order to better facilitate resettlement work, Hebei's provincial government intends to provide employment stabilization subsidies from its unemployment insurance fund to enterprises that pay the full amount of unemployment insurance and actively avoid layoffs. Local governments can provide one employment stabilization subsidy each year to enterprises that meet the aforementioned scope and intend to implement industrial structure adjustments and air pollution controls. The subsidy comes from the unemployment insurance fund, and will mainly cover living allowances, social insurance, job transfer training and skills training for workers. To gualify for a subsidy, an enterprise must fulfill the following: taken effective measures to stabilize jobs over the previous year without any layoffs - a subsidy can be offered equal to 50% of the total amount of unemployment insurance premiums paid by the enterprise and its employees over the same time period; taken effective measures to stabilize jobs over the previous year with its layoff rate at 1% or lower than the registered unemployment rate in the area - a subsidy can be offered equal to 40% of the total amount of unemployment insurance premiums paid by the enterprise and its employees over the same time period; taken effective measures to stabilize jobs in the previous year with its layoff rate at 1% or less than the lower the registered unemployment rate in the area - a subsidy can be offered equal to 30% of the total amount of unemployment insurance premiums paid by the enterprise and its employees over the same time period.

In 2016, Tangshan allocated RMB1.009 billion (US\$157.6 million) worth of employment stabilization subsidies, of which RMB771 million (US\$120.5 million) was allocated to enterprises undertaking overcapacity reduction and implementing pollution controls, accounting for 76.4% of the total. Since 2016, there has not been any large-scale unemployment caused by overcapacity reduction.

### 2.2.3 Industrial transfer costs

During overcapacity reduction, the adjustment and transfer of existing industrial structure and industrial docking, as well as the cultivation of new industries all face huge industrial transfer costs. In the process of industrial transfer, the costs will increase with the compensation for relevant stakeholders, resettlement of industrial transfers, and renovations of the worksites. In addition, after the transfer, there may be unsustained industrial development. Due to potential differences in the industrial structure of the new region, the interdependence of industries and lack of linkage between the upstream and downstream, it may be difficult to cultivate industry interaction and achieve the agglomeration and scale effects, which would lead to rising costs. Furthermore, there will also be costs to reconstruct public services as the new industrial area needs to re-plan traffic routes and re-construct water, electricity and other infrastructure utilities based on the needs of the workers.

### 2.2.4 Reduction of fiscal revenue due to overcapacity reduction

In the short term, overcapacity reduction will affect the output and profit of an enterprise. In particular, the closure of enterprises has serious impact on local economic development, resulting in reduced industrial output and tax revenue. In 2016, the gross regional domestic product of the Fengnan District of Tangshan City in Hebei reached RMB61.76 billion (US\$9.65 billion), accounting for 9.8% of the GDP of Tangshan. The general public budget revenue of Fengnan District in 2016 was RMB3.15 billion (US\$492.2 million), accounting for 8.9%<sup>38</sup> of the general public budget revenue of Tangshan. In terms of overcapacity reduction, Bainitic Steel Company from the Fengnan Town of Fengnan District got rid of 1.05 million tons of iron production capacity and 4.91 million tons of steel production capacity; its industrial output decreased by RMB2.72 billion (US\$425 million) and its tax revenue dropped by RMB100 million (US\$15.6 million)<sup>39</sup>.

### 2.2.5 Increased financial expenditure due to higher financial and social risks

Under the influence of factors including economic downturns, market oversupply and national policies on overcapacity reduction, the industries with overcapacity are having a difficult time staying open. Some companies have suffered serious losses, and bad loans have started to increase in the banking industry. To solve the debt crisis, banks are the primary driver. If improperly handled, the results will lead to systemic financial risks.

The majority of the industries that have overcapacity are labor-intensive industries. If outdated production capacity is cut and zombie enterprises are closed, it will lead to laid-offs of a great number of people; society would thus face a need for large scale job transfers and the widespread resettlement of workers, which, if not properly handled, would lead to economic instability. For example, Tangshan Guofeng Iron and Steel Company actively responded to

<sup>38.</sup> Source: Tangshan Statistic Brief 2016.

*<sup>39.</sup> Provided by the Finance Bureau of Fengnan District during the survey.* 

national policies and shut down its northern production line. 4,063 workers were laid off. To ensure the timely allocation of economic compensation to their workers, the company raised RMB300 million (US\$46.9 million) from various channels to resettle the laid-off workers. If the utilization of these funds are inefficient, the laid off workers will suffer, the local employment market will become unstable, and costs to the government will increase.

## 2.3 Analysis of enterprises' cost of overcapacity reduction

### 2.3.1 Increase in resettlement costs for workers

As progress is made in overcapacity reduction, the question of worker resettlement is becoming more complex and challenging. Based on pressures from rising labor costs and a significant gap in the resettlement fund, there is risk of recessive unemployment, examples being internal retirement and rotating holidays. When in the process of resettling workers, enterprises should follow the Labor Law and Labor Contract Law strictly, to improve the labor relationship and pay economic compensation. Surveys show that in 2016, Hebei resettled a total number of 57,785 workers who were displaced due to overcapacity reduction; 32,450 of these people transferred jobs, 4,755 were internally retired, 18,295 people terminated their labor contracts, and 2,285 people received natural attrition. It is estimated that it takes an enterprise RMB90,000-200,000 (US\$14,000-31,000) to resettle one employee, thereby confronting enterprises needing to engage in employee resettlement with large financial obligations.

### 2.3.2 Increase of production and operation costs

Overcapacity reduction increases the operational costs of downstream enterprises. After 2016, most of the iron and steel enterprises in Hebei were joint production enterprises. When production at the front-end was reduced, enterprises at the back-end needed to outsource, which directly increased operating costs. This is mainly reflected in the fact that with the expansion of overcapacity reduction, the cement and coke industries in Hebei could not meet the needs of the province, and thereby decided to purchase from other provinces, a decision which increased transport costs significantly.

Overcapacity reductions also increase an enterprise's costs in terms of technological transformation, and research and development. Overcapacity reduction is not simply the act of shutting down outdated capacity, but includes the need to optimize existing capacity structures and protect the environment. In turn, increased investment by an enterprise in technological research and development, safe production, environmental protection, energy saving and emission reduction will result in increased production costs. For instance, iron and steel companies in the Fengnan District of Tangshan City in Hebei invested a total of more than RMB2 billion (US\$312.5 million), and completed 152 atmospheric upgrading projects, including desulfurization and dust removal; they invested in 2016 RMB200 million (US\$31.25 million) and completed a total of 19 treatment projects on sintering machines to ensure that emission concentrations from sintering machines, shaft furnaces for desulfurization and particulate matter from flue gas meet the national special emissions standards.

### 2.3.3 Increased cost for corporate financing

Overcapacity reduction has increased the financing costs for enterprises. With the nationwide implementation of overcapacity reduction policies, banks have started to exclude overcapacity enterprises from their support, thereby tightening the credit scale for these enterprises, and increasing the cost and difficulty for enterprises to raise funds. Even leading enterprises may be affected and unable to obtain funding. When banks stop releasing loans to enterprises or call in loans ahead of schedule, it creates serious problems. A survey in Hebei showed that in Handan alone, RMB7.5 billion (US\$1.17 billion) of loans were withdrawn by the banks. Without loans from banks, sourcing financing becomes more complex and expensive.

### 2.3.4 Increasing difficulties in debt management

By cutting excess capacity, enterprises face greater operating pressures, substantial declines in benefits, higher operational risks, and even, in the worst cases, the suspension of production altogether. It is easy for these enterprises to become tangled in a debt. Enterprises will be greatly affected by such dire circumstances, resulting in adverse outcomes such as unpaid wages and delays in the payout of social security insurance. If this wasn't bad enough, it becomes even more difficult to manage debt after overcapacity reduction. Take Tangshan City as an example. In 2017, four steel enterprises will be closed, with a total liability of RMB5.4 billion(US\$0.84 billion). Among the liability, RMB980 million (US\$153.1 million) are bank loans, with the rest being a mix of corporate loans, social funds, arrears, arrears of wages and social insurance.

### 2.3.5 Relocation cost

Hebei Province sped up its major relocation and renovation projects by relocating its key polluting industries - iron and steel coking - from urban areas to industrial parks, in accordance with the 1:1.25 ratio of capacity reduction replacement. For the six major projects - Construction of Shougang Jingtang II, Relocation of Tangshan Bohai Iron and Steel Company, Relocation of Shijiazhuang Iron and Steel Company, as well as the Relocation of Yongyang Special-steel Company, Taihang Iron and Steel Company and Ji'nan Iron and Steel Company from Urban Areas to Industrial Parks – that are listed in the Restructure Plan for Iron and Steel Industry in Hebei, a special working group was set up to provide solutions and enable the projects to be completed as early as possible. A comprehensive exit plan has been introduced to Xuanhua Iron and Steel Company, which merges it with parts of Tangshan Iron and Steel Company and Chengde Iron and Steel Company, thereby reducing its capacity and relocating it to a new area. In this process, there will be relocation costs on the enterprises.

### 2.3.6 Merger and reorganization cost

After overcapacity reduction, some enterprises cannot continue normal operations. After an initial survey, there were 11 "zombie enterprises" in the iron and steel industry in Hebei. Taking into account the interests of different stakeholders, including the workers, such enterprises engaged in mergers, restructuring, bankruptcy, and other approaches. In the area of mergers and reorganization, enterprises needed to pay capital investment costs to engage such approaches.

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### 2.3.7 Opportunity cost

The opportunity cost of an enterprise includes part of the measures to reduce excess capacity, including production suspension and limitation. But periodic production suspension will not only affect the income of the enterprise, but also increase labor costs and corporate maintenance costs. Hebei sets strict controls over the introduction of new capacity. In the case of market recoveries, the loss of profit opportunities after capacity reduction has led to declines in business income.

## **2.4** Analysis of cost of overcapacity reduction by the financial system (with banks as an example)

### 2.4.1 The cost of the rising bad debt rate

Statistics shows that the average debt ratio for iron and steel enterprises in Hebei in 2016 was 65%; this figure will likely rise in 2017. Among them, loans from banks and financial institutions account for a considerable proportion. In 2017, four iron and steel enterprises will leave Tangshan City with a total liability of RMB5.4 billion (US\$0.84 billion), of which RMB980 million (US\$153.1 million) is bank loans. Production capacity will cause banks to increase their percentage of non-performing loans. Among the industries with excess capacity, inefficient enterprises with high debt take up a lot of credit resources. Once the capital chain breaks, it will result in non-performing loans that the banks will have to endure; this is an unfavorable situation, given that such a rise in non-performing loans means a reduction in the the amount of loans, thus forming a vicious cycle that could produce systemic risks.

### 2.4.2 Increased cost of due diligence for certain industries and enterprises

Fearing that overcapacity reduction will turn questionable debts into bad debts and cause an increase in non-performing assets, banks have begun producing lists of the industries targeted for capacity reducation, and either tightened their requirements for extending credit to them or stopped lending altogether. In addition, in order to prevent and manage risks, banks have enhanced due diligence for industries undergoing overcapacity reduction, which has resulted in increased costs. A survey in Hebei showed that in Handan alone, banks have reduced the amount of available credit by about RMB7.5 billion(US\$1.17 billion).

## 3. Analysis of the benefits of overcapacity reduction

At first glance, overcapacity reduction is only about cutting excess capacity. But it also involves the optimization of production structures, reduction of industrial emissions, improvement of resource utilization efficiency, and responses to climate change. It covers a wide range of industries and sectors; its performance has complex and non-market qualities. Benefit analysis related to overcapacity reduction from only one perspective is bound to be biased; thus multiple aspects should be considered to assess the efficiency of such reduction. this report intends to evaluate the benefits of public expenditures on overcapacity reduction from three aspects: ecological sustainability, social sustainability and economic sustainability. In terms of the specific evaluation indicators, quantitative data is mainly used to analyze the effectiveness of overcapacity reduction in Hebei, which is then compared with the national data. For the fields where data is unavailable in the short-term, a qualitative analysis has been done.

Type of Benefit	Main Reflection		
Ecological sustainability	Reduce resource consumption and emissions		
	Improve the quality of ecological environment		
	Promote the construction of ecological civilization		
Social sustainability	Promote the health of residents		
	Promote the development of people's livelihood		
Economic sustainability	Enhance the quality of economic development		
	Promote economic transformation and upgrading		
	Optimize the industrial layout		

#### Table 14 Benefit analysis framework of overcapacity reduction

## **3.1 Eco-environmental benefits**

The core objective of overcapacity reduction is to reduce the current over-reliance on resources and labor inputs for economic development and to improve the way the Chinese economy approaches sustainability objectives. In terms of the resource use efficiency, overcapacity reduction involves the reduction of resource consumption and emissions and the improvement of air quality. Regarding ecological and environmental benefits, overcapacity reduction is crucial for building an ecological civilization.

#### 3.1.1 Reduce resource consumption and emissions

For a long time, China was an underdeveloped country with vast resources. But mass resource exploitation paired with new technologies accelerated the consumption of resources to unforeseen heights. In the case of excess capacity, resource consumption does more harm than good. On the one hand, people are consuming the resources of future generations. On the other hand, such consumption has devastated China's environment, from air to water to soil. When environmental endurance reaches a certain threshold, all further environmental damage will be for intents and purposes irrevocable. Overcapacity reduction cuts inefficient production capacity through resource utilization. When the traditional capacity is reduced, new capacity will have been created with sustainability in mind, thus ensuring the rational use of resources.

In Hebei, during June 2016, the Hebei provincial government revised six local standards dealing with environmental protection, energy consumption, water consumption, quality, technology and safety in order to push overcapacity reduction; these local standards were stricter than the

national standards or industry average. Judging from the current situation, energy consumption in Hebei has decreased significantly, and the energy consumption indicators and the added value of every RMB10,000 for industrial enterprises are both faster than the national level.



Industrial energy consumption has been declining relatively fast in Hebei over recent years. Except in 2016, the decline rate is higher than the national average (see Figure 15 for details).

**Figure 15 The comparison of energy consumption between Hebei and the country in 2011-2016** Source: Annual statistic reports of Hebei, Annual reports of National Bureau of Statistics

In terms of water consumption, for every RMB10,000 of added value, Hebei has maintained a high water consumption efficiency. Its water consumption in 2014 was only 29.69% of the national level, and its water consumption has been on rapid decline since. In 2013, the water consumption of every RMB10,000 yuan of added value already ranked fourth in the country, only after Tianjin, Shandong and Beijing. In 2016, the Hebei Water Resources Department issued more stringent water management objectives, and planned to reduce the number to 12 tons by 2020 (see Figure 16 for details).



Figure 16 Change of water consumption every 10,000 yuan of industrial added value in Hebei in recent years

Source: NDRC Website, National Statistic Reports, Hebei Daily, Hebei Water Conversation Plan

## 3.1.2 Improving the quality of the ecological environment

A good ecological environment is the fairest public product and the most inclusive benefit for the general public. At present, however, the environment is a weak point for China, and so addressing it has become an important part of the current economic and social system reform. Reducing overcapacity is a process whereby emissions are reduced through structural reform, technology adoption, engineering innovation, and the development of more sustainabilityfocused management strategies. It is a holistic process, involving not only the enterprise itself, but the government and the local community.

Hebei has also made improvement in the area of air quality. The annual average concentration of PM2.5 has fallen by nearly 40µg/m3 during the period of 2013-2016, down more than 30%, with the average annual reduction exceeding 10%. Other major pollutants, such as PM10 and ozone, have also seen significant reductions in their concentrations. In 2016, excellent or good air quality was reported for 75 days more than in 2013; heavy pollution was reported for 50 days less. Generally speaking, the quality of the air has improved significantly during the period of 2013-2016 (see Figure 17 for details).



Source: provincial environmental status bulletins over the years

## 3.1.3 Promoting the development of an ecological civilization

Since the 18<sup>th</sup> National Congress of the CPC in 2012, President Xi Jinping has integrated the concept of an ecological civilization into China's economic, political, cultural and social development. The People's Government of Hebei has accelerated the building of an ecological civilization since 2015. Reducing overcapacity is an important aspect of this effort. Reducing overcapacity means to change the existing development approach, which wastes resources

indiscriminately, to reduce dependence on resources and labor, to accelerate away from traditional industries characterized by high pollution, high consumption, high risk, low benefits and low output, and to regard green, eco-friendly processes as the only way to achieve green development. Structural optimization is also employed to promote the transformation and upgrading of the entire economy, and to achieve the synchronization of industrialization, informatization, urbanization, agricultural modernization and green development. In the long run, the efforts to reduce overcapacity are conducive to promoting the development of an ecological civilization.

## 3.2 Social benefits analysis

In the long term, reducing overcapacity is conducive to sustainable social development. It can promote the health of residents by squeezing out inefficient, surplus production capacity, promoting the upgrading of production technologies and improving environmental quality. Through the responsible use of resources, it also contributes to the long-term stability of employment, incomes and people's livelihoods.

## 3.2.1 Promoting residents' health

A good ecological environment is the basis for human survival and health. Without good health, there will never be prosperity for the whole society.

The extensive economic growth pattern that has prevailing for some time has negatively impacted the health of Chinese society. By raising energy consumption standards and reducing the level of emissions, reducing overcapacity can curb the exacerbation of environmental decay. The elimination of inefficient capacity and the development of efficient and quality capacity is a core aspect of the green development concept.

A look at the provincial picture of respiratory diseases (tuberculosis and influenza) over the past two years reveals that both the respective number of cases and the share of their respective cases to the total cases of all diseases have shown relatively strong seasonality, small variation from extreme values and minimal year-on-year differences in the years concerned. There might be a relationship between overcapacity reduction and the health status of residents. However, this will be a long-term effect which cannot be observed yet.



Figure 18 Number of cases and share of the total cases of the two respiratory diseases in Hebei in recent years



## 3.2.2 Improving people's livelihood

In the short term, Hebei Province has given top priority to protecting worker rights and ensuring that displaced workers find adequate resettlement. It has widened the options for relocating laid-off workers, including internal diversion/transfer, entrepreneurship, early retirement, and transfers to other public offices. In total, Hebei accommodated 57,785 workers in 2016. Government expenditures in this area have effectively prevented adverse social impact through unemployment

In the long term, the campaign to eliminate outmoded overcapacity can lead to the responsible use of resources, promotion of a clean environment and sustainable social development.

## 3.3 Economic benefits analysis

The efforts to reduce overcapacity are an important part of supply-side structural reform in China. Under the new normal, the original growth pattern has been shown to be entirely deficient, hence the necessity to adjust production structures through supply-side structure reform. The campaign to reduce overcapacity has improved the quality of economic growth, promoted a new approach to economic development and facilitated the optimization of industry distribution.

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### 3.3.1 Improving the quality of economic growth

The campaign to reduce overcapacity can improve short-term control policies and ensure sustainable economic growth. By directly adjusting the capacity structures, it can restrict the huge input of production materials and prevent price competition due to excess supplies of the industrial products. Moreover, by directly guiding the adjustment of industrial structures, it can contribute to the reduction of production costs, the improvement of production efficiency and the increase of added value inputs.

Currently, the campaign to reduce overcapacity has improved competition between industries in Hebei. In recent years, provincial data on industrial enterprises above the designated size have outperformed the national averages. This means that the province has preliminarily adapted to the new normal of economic development in China. A comparison of the industrial data of enterprises above the designated size reveals that the province's growth rate has rebounded from 4.4% in 2016, the lowest level in 2015; the operating revenue and the total profit growth rates have both become positive; total profit growth rate has bounced back from -11% in 2015 to 18.9% in 2016, seeing the highest level over the past five years. Overall, the industrial sector above the designated size in Hebei has seen its profits increase dramatically.





### 3.3.2 Promoting economic transformation and upgrading

Economic transformation and upgrading are important objectives in the campaign to reduce overcapacity. Hebei has improved in this area through its capacity reduction efforts.

On the one hand, Hebei has improved the technology associated with its capacity. Based on its

local energy standards, it encourages enterprises to increase R&D in iron and steel production, equipment adoption and technology development; it wants enterprises to conserve energy while producing high-end iron and steel products, thus giving them the opportunity to be included in the national catalogue of high-tech enterprises. It is also striving to foster steel-consuming enterprises that manufacture construction-purposed steel structures or metal products and develop non-steel enterprises that process and distribute steels. By the end of the 13<sup>th</sup> FYP period, the ultimate objective is to make the equipment of the province's iron and steel industry internationally advanced, raise the share and variety of special steels, and exceed 30% in operating revenue from non-steel businesses.

On the other hand, Hebei is trying to improve the quality of its incremental capacity. It is guiding the iron and steel manufacturing industry in integrating internet technologies to increase efficiency; a core focus concerns developing the transport equipment, energy equipment, engineering and special equipment, and basic parts industries and ensuring that the value add from the equipment manufacturing industry exceeds that of the iron and steel industry over the next year. In addition, the province has exerted great efforts to develop new technologies, industries, businesses and models by executing a three-year action plan; it includes key benchmarks for developing a modern service industry, a high-tech industry amplification plan and a small-and medium-sized sci-tech enterprise growth plan. Its objective is to make the value add from the service industry account for 45% of the total GDP and the value add from strategic, emerging industries account for 20% by 2020.

Hebei has adjusted the structure of its primary, secondary and tertiary industries. In 2016, the share of its secondary industry dropped 16.8%, while the share of the tertiary industry increased 17.8%, from 2011.





According to the situation of existing sci-tech industries, Hebei's measures to transform the relevant industrial structures has been effective. The growth rate of the sci-tech industries was higher than that of the industrial enterprises during the period of 2011-2016. The gap between the two narrowed in the early stage of that period, but as the former remained above 10% and the latter began to fall, the gap between the two gradually widened. In the past three years, the growth rate of the sci-tech industries remained 8 percentage points higher than that of industrial enterprises. Accordingly, the contribution of the sci-tech industries to the regional economy has been increasing consistently. By 2016, it already accounted for 18.4% of the value add from the industrial enterprises, 2.2 percentage points higher than that in 2015. The effectiveness of such economic transformation is therefore clear.



Figure 21 The sci-tech industry grew faster than the industrial enterprises above the designated size during the period of 2011-2016

Source: website of the Provincial Bureau of Statistics of Hebei

### 3.2.3 Optimizing the industrial layout

Industrial layouts exist to optimize the regional economic structures and spatial organization structures of the industries through the responsible allocation and flow of industrial factors. The optimization of the industrial layout is conducive not only to the clustering of industries, formation of upstream and downstream industries and relocation of industrial activity from ecologically vulnerable areas to areas with relatively high carrying capacity, but also reducing pollution, conserving ecological resources and optimizing economic structures. Responsible industrial layoutd can help achieve good social, economic and ecological effects, and are therefore key for harmonizing economic, social and environmental development.

Hebei's industrial layout is confronted with problems such as scattered distribution, low level integration, horizontal divisions of work and inadequate coordination between industry clusters. Irresponsible industrial layouts have restricted the further development of the province.

So Hebei plans to combine the campaign to reduce overcapacity with efforts to optimize its industrial layouts. Such a combination aims to address the low concentration and irresponsible geographic distribution of the iron and steel industry through consolidation and restructuring, layout optimization and outward transfer; such a process would raise the level of development and sharpen the competitive edge of the iron and steel industry.

Concerning consolidation and restructuring, Hebei will combine the efforts of key enterprises with the government to undertake cross-regional and cross-industrial downsizing and restructuring in order to raise the level of industrial concentration. By the end of the 13<sup>th</sup> FYP period, the number of iron and steel enterprises in the province will be reduced to 60 from 109 and led by such flagship enterprises as HBIS Group and Shougang Group; it will also consist of 3 local groups and 10 characteristic enterprises in addition to the flagships.

Concerning the optimization of industrial layouts, Hebei will cut the capacity of environmentally sensitive areas and the areas on the rim of Beijing and Tianjin to encourage and guide the iron and steel production capacity to relocate to coastal port areas or at least move away from inner city areas into the industrial parks. During the 13<sup>th</sup> FYP period, the cities of Zhangjiakou, Baoding and Langfang will have all of their iron and steel production capacity cut; Qinhuangdao and Chengde will have 50% of their capacity cut; and other cities and their surrounding areas will also gradually dismantle their steel plants or relocate them to industrial parks or coastal areas.

Concerning international cooperation in this effort, Hebei will encourage leading enterprises to set up production and manufacturing bases overseas to handle key projects. During the 12<sup>th</sup> FYP period, the province has realized rapid development in go-global efforts and international capacity cooperation. It has accumulated US\$7.05 billion worth of direct foreign investment, which was 4.7 times that of the 11<sup>th</sup> FYP period. Particularly, a number of international capacity cooperation projects, such as the 2.2 million ton steel project of Hegang Group in Serbia and the 1.2 million ton cement project of JIDD, have been successfully implemented.

## 4. Key conclusions and recommendations

## 4.1 Key conclusions

## 1. Overcapacity reduction is a significant measure for dealing with climate change; more research should be done in this area.

Paris Agreement, aimed at stepping up the enforcement of the UNFCCC, presents the global blueprint and visions for tackling climate change and achieving green economy after 2020; such an achievement would be a notable landmark in the history of climate governance. China has assumed environmental responsibilities and is actively working towards its Paris Agreement commitments. China has clarified a series of targets, including peaking its CO2 emission by 2030. These targets have been integrated into China's overall development agenda. Now and henceforth, the promotion of low-carbon models of economic development is critical

necessary to close outdated production facilities and promote the transformation of economic development patterns, improve the quality of economic development and cope with climate change. It is of utmost necessity to strengthen research on institutional set-up, policies, tools and cost-effectiveness assessment related to overcapacity reduction.

## 4.1.2 The exorbitant cost of the campaign to reduce overcapacity is to be shared by the government and enterprises.

To more comprehensively evaluate the cost of overcapacity reduction, there is a need to take into account the actions and measures of government, financial institutions and enterprises and to divide the cost among all stakeholders accordingly. Considering all the stakeholders and their respective characteristics, this report used visible costs, invisible costs and opportunity costs, and constructed a cost matrix. Our multi-dimensional matrix analysis shows that stakeholders like the government and banks have paid a high price to reduce overcapacity. In our analysis of the overall cost, apart from the explicit expenditures of the central government, and given that the provincial government and the county/city governments supported capacity reduction efforts with earmarked funds, this report also paid attention to the implicit expenditures of the governments, banks and enterprises, although the latter is hard to quantify.

## **4.1.3** The campaign to reduce overcapacity has generated preliminary effects in economic, social and ecological sustainability.

The campaign to reduce overcapacity aims to achieve a shift from an extensive economy to a circular economy by means of reforming the mode of production in the industrial sector, thereby reducing environmental pollution, damage due to industrial wastes and the negative impact of human activities on the climate. For Hebei, the effort to reduce overcapacity is an important component in the effort to build an ecological civilization. By 2016, overcapacity reduction has generated initial effects in social, economic and ecological sustainability. In terms of the social benefits, it has been associated with improvemnet in long-term employment stability, income increase and an overall improvement in the livelihood of local residents. In terms of economic benefits, it has contributed to the improvement of the quality of economic growth and economic transformation, and to the optimization of industrial structures and layouts.

## 4.1.4 The cost is higher than the benefits of the campaign to reduce overcapacity in the short term.

Based on field investigations and the cost-benefit analyses in this report, this report conclude that the cost of the campaign to reduce overcapacity is higher than the benefits in the short run. Stakeholders, including the government, enterprises and banks, are under considerable pressure from current expenditures. Analysis on the debt, cost and profit data of the province's industries indicate an increase in the current cost of production and a decrease in the profitability. However, this report argues that the benefit is ultimately higher than the cost in the long run. At the micro level, the campaign has already helped enterprises reduce cost and increase profit. By improving enterprise performance in areas such as environmental protection, energy consumption, quality and safety, it is able to effectively eliminate outmoded capacity

and lower the overall production cost to society. By adjusting the structure of production and increasing the added value of production, it can drive a steady increase of profit in the end. At the macro level, as elucidated above, the campaign has a great potential in helping achieve social, economic and environmental objectives.

## 4.2 Recommendations

## 4.2.1 The campaign to reduce overcapacity needs to be put in the context of developing a circular economy and optimizing industrial layouts.

In view of our field investigation in Hebei, this report suggests that the campaign to reduce overcapacity should not only focus on emission reduction; instead, it should take into consideration the need to develop a circular economy, recycle waste, and adjust and optimize industry structures in policy design.

## 4.2.2 There is the need to implement policies in a differentiated manner and to optimize policies in a dynamic manner.

This report must adjust the tasks and goals of overcapacity reduction in a timely and optimized way. The policies aimed to reduce overcapacity must be implemented in a differentiated manner, with industry chains and supports, taken into consideration. For example, policies may be enforced with respect to the single-product coking industry, but may be adjusted with respect to enterprises that integrate coking and steel production and whom require the installation of desulfurization equipment. Differentiated treatment may be provided for different products. For example, many aluminum products in the electrolytic aluminum industry, and many special steels in the iron and steel industries, are all products that fall short of demand; in light of this, policies should guide and support such industries concerned to improve their technology and sharpen the competitive edge of their products.

## 4.2.3 The incentive and subsidy policies of the central government need to be perfected.

To support local efforts to reduce the overcapacity of the iron, steel and coal industries, the central government has set up a special incentive and subsidy fund for industrial enterprises to divert and accommodate workers in the process of reducing excess capacity. This report learnt from the field investigation that there was still room for improvement in the area of subsidies and incentives. For example, the measures for allocating the national incentive and subsidy fund need to be adjusted; the flexibility and effectiveness of the fund's uses need to be improved. The allocation of the fund should take into consideration the overall tasks of enterprises, the number of workers in need of resettlement and the difficulties associated with reducing overcapacity. So, enterprises may use the fund for a broad range of purposes such as capacity compensation, worker relocation, compensation for asset loss, debt repayment and the internal transfer of workers. Under the current provisions, there is at least the need to clarify that the fund can be used not only for worker resettlement purpose, but also to cover related costs such

as worker endowment insurance, payment of the premiums in arrears for social insurance. In transferring funds, not only workers directly affected by capacity reduction activities, such as the closure of equipment, but also workers who are indirectly affected, such as those who work in industries that manufacture now obsolete machinery, need to be considered. Also, enterprises who decided to close earlier than scheduled need to be supported. Moreover, performance evaluations of the incentive and subsidy policies need to be improved, so that the policies are result-oriented and their incentive role is strengthened.

## 4.2.4 The analytical framework for climate public expenditure review needs to be expanded and relevant research needs to be strengthened.

The cost-benefit analysis on the climate public expenditure project is an important part of climate public expenditure evaluation, and is of great significance for improving the performance of public expenditures and responding to climate change. This report has established a multi-dimensional matrix analytical framework and systematically analyzed the costs and benefits of overcapacity reduction. With respect to the cost analysis, it distinguished between stakeholders, such as the government, banks and enterprises, and divided costs into visible cost, invisible cost and opportunity cost. With respect to the benefit analysis, it makes macro and micro analyses in terms of the ecological benefits, the social benefits and the economic benefits. The multi-dimensional matrix analytical framework this report proposes needs to be improved and expanded via more case studies.

## 4.2.5 The collection and statistical analysis of information and data relating to climate public expenditure needs to be enhanced.

The cost-benefit analysis for climate public expenditure is confronted with not only technical challenges, but also challenges from data availability. As evaluation of climate public expenditure is a completely new domain, the statistical scope and criteria for climate public expenditure have yet to be unified, and the evaluation method has yet to be perfected. Climate public expenditure involves many departments, so the generation of basic cost-benefit data requires cooperation on the part of a variety of government agencies. In the future, there is a need to enhance the collection and statistical analysis of basic climate public expenditure information, accelerate the development of a national climate change database and sort out the data and information resources scattered across the development, reform, fiscal, environmental protection, agricultural, health and family planning, and statistical departments, to achieve interconnection, sharing, updating, integration and ultimately a synthesis of the information on climate public expenditure.

## Conclusion

As the world steps into the development era led by the SDGs, green development has been prioritized in China's most recent social-economic development planning – the 13th FYP. To achieve this, China's vision of an ecological civilization is proposed as the overall framework to consolidate policy tools that direct resources and efforts to promote a balanced and inclusive economic growth which does not compromise environmental sustainability.

Against this backdrop, CPEIR II was launched to provide institutional, policy and public expenditure analysis at the sub-national level to systematically review the current status of multi-dimensional support for climate change activities and gauge the level of complementarity among different elements. The goal is to identify key areas for further intervention and provide possible solutions to strengthen climate change governance in China.

The report focuses on Hebei – a heavily industrialized place with serious environmental problems. The province represents a pertinent case to test out means to realize the ecological civilization envisioned by China, given its challenge to manage structural economic transition and its green growth ambitions. Its experience in this regard could provide valuable lessons for other provinces, or sub-national jurisdictions in other developing countries, which are exploring their own strategies for curbing climate change and protecting environmental integrity while maintaining strong economic growth.

## 1. Climate public expenditure and institutional review

Hebei is making remarkable progress in addressing climate change given the strategic importance it has attached to green growth. At the institutional level, in 2008 it set up an interdepartmental coordination mechanism, namely, the Leading Task Force on Tackling Climate Change in Hebei (LTTFTCC), to take charge of climate change activities. This has ensured that the various ministries involved are simultaneously engaged with tasks that help reduce climate change in different ways. Broadly speaking, different lines of ministries are engaged according to a range of functions they could perform, including climate mitigation and adaptation, technology development and capacity building, as well as international cooperation.

Under the overall leadership of the LTTFTCC, Hebei has issued more than 50 policy documents to address climate change, focusing predominantly on the mitigation of CO2 emission (e.g. by improving energy efficiency, optimizing energy structures, and increasing forest carbon) and adaptation (e.g. through capacity building in water resource management, agriculture and forestry, marine resource and infrastructure, and disaster risk management). These documents are primarily issued to guide domestic efforts.

To implement the policies formulated, various sources of financial capital need to be mobilized to provide support. For instance, fiscal funds are primarily distributed in nine main fields that contribute to tackling climate change, ranging from ecology restoration, air pollution control,

water management, and energy efficiency to agricultural development. It is worth mentioning that many innovative financing approaches have been adopted to address climate change issues (e.g. Public-Privat-Partnerships (PPP)), implying that an expanding array of sources are being applied to complement fiscal funds and enlarge the pool of climate finance.

This report has discovered that public expenditure on climate change was on the rise during the 12th FYP period. In 2011, around 8% of the provincial budget was spent on high or moderately related climate change activities. This number kept growing year over year until 2015, when about 11% was recorded, equivalent to RMB39 billion (US\$6.1 billion) of fiscal expenditure. Moreover, it is worth noting that this level of climate public expenditure was above spending at the central level. For example, around 10% of Hebei's budget was allocated for high or moderately relevant climate change activities compared to that of 7% at the central level.

### 2. Cost-benefit analysis

This report also conducted cost-benefit analysis associated with overcapacity reduction in Hebei. An overarching framework has been established to examine costs and benefits in a multitude of dimensions. Specifically, the visible, invisible and opportunity costs for each stakeholder are defined and identified in the report.

As to the state, the main costs refer to the reduction of tax revenues and provision of subsidies to the enterprises for the resettlement of the laid-off. The latter alone cost Hebei RMB105 million in 2016. As to the enterprises which are assigned the task of reducing overcapacity, the main costs relate to staff replacement and industrial upgrading, among others. It is estimated that to resettle one worker costs RMB90-200,000 for a company. In 2016, 57,785 laid-off workers were resettled, resulting in RMB5.2 million – 11.6 million (US\$0.8 million - 1.8 million).

Concerning benefits, positive effects are diagnosed in all three pillars of sustainability in Hebei: energy consumption levels of industrial enterprises has kept decreasing; economic structures are transitioning and being optimized (e.g. the share of tertiary industry in gross GDP increased by 17.8% in 2016 compared to that of 2011); and better air quality is likely to result in better health for local residents (although the effect may not be manifested in the short term).

### 3. The next step

This report has attempted to review climate institutions, public spending and its cost-benefits at the sub-national level in China. There are two important methodological contributions of the report apart from empirical findings in Hebei. First, when categorizing the climate-relevance of budget items, the it considers the nature of the activities; i.e. whether it mitigates or adapts to climate change. This break-down could help better understand the potential effects of climate spending. Further, it could help broadly track the portfolio of activities climate spending is targeted at. This could provide useful insights for decision makers to introduce, adjust or balance budget items in order to maximize their intended outcomes. For instance, more of the budget may be reserved for highly relevant activities which could simultaneously contribute to mitigating and adapting to climate change.

Second, the report has tentatively established a holistic theoretical framework to guide the costbenefit analysis of climate spending. This is one of the first attempts to set up a multi-criteria framework to assess costs and benefits across all pillars of sustainability, thereby raising the challenge of balancing different development priorities (e.g. economic growth, social protection and environmental protection) with the interests of different stakeholders. Moreover, the framework has directed attention to the importance of a systematic approach, which places great emphasis on the inter-connections between industries and the vertical development within specific industries. For instance, when costs are calculated, it is indispensable to consider the supply and demand of goods and services along the entire industrial chain that climate activity could have potential bearings on.

This report has laid the foundation for further research on a few topics. First, the costeffectiveness of climate public spending; i.e. the 'value for money' tradeoff can be investigated going forward once more data is gathered. Second, more domestic financial flows can be analyzed and consolidated in preparation for building up an integrated national development financing framework. In China's context, it is of particular importance to broaden the analysis in connection with green finance, within which a wider range of financial flows (e.g. green bonds, insurance, emissions trading schemes) can be leveraged to promote green development, including addressing climate change. During this process, the private sector must play a crucial role. However, their financial contributions need more stringent monitoring and evaluation to ensure development effectiveness.

## Annex I. Policies on climate public expenditure

This part analyzes policies on climate public expenditure and innovative expenditure patterns of Hebei. Financial expenditure information is divided into two categories: financial investment policies and innovative expenditure patterns. Financial investment policies can be divided into 9 categories: direct response to climate change, ecological restoration, groundwater over-exploitation management, energy saving and emission reduction, and energy structure optimization, energy efficiency improvement, comprehensive agricultural development, rural transformation, flood prevention and disaster relief. Innovative expenditure patterns can be divided into 4 categories: public-private partnership, international loans, clean development funds and emission trading.

### **1. Financial investment policies**

#### (1) Direct response to climate change

Between 2013 and 2015, Hebei Province invested a total amount of RMB 45.73 billion (US\$7.15 billion) on air pollution control (RMB 12 billion (US\$1.9 billion), 16.03 billion (US\$2.5 billion) and 17.7 billion (US\$2.8 billion) respectively), and continued to innovate in fund allocation, supervision and evaluation mechanism, which ensured the smooth implementation of pollution control projects. Through budget integration and adjustment, coordinate the operating budget of special funds and state capital in provincial environmental protection, air pollution control, technical transformation of industrial enterprises, energy saving and emission reduction, strategic emerging industries, scientific and technological innovation, and give priority to support expenses related to air pollution control.

#### (2) Ecological restoration

In 2014, Hebei invested around 70 billion yuan in projects including comprehensive management of groundwater over-exploitation pilot project, Green Hebei Project, the Middle Route Supporting Project for South-North Water Diversion, the Lake Filling Project for Diverting Yellow River into Hebei, the Mountain Restoration Project, Tailing Pond Comprehensive Management Project, Pollution Control for Coastal Waters in Beidaihe and Adjacent Areas, Baiyang Lake Comprehensive Management Project, Lake Wetland Protection Project, Agricultural Water-saving Irrigation Project, Heavily Polluted River Management Project, Shuangfeng Temple Reservoir Construction Project, Soil Erosion Management Project, High-standard Farmland Construction Project, Clean Agricultural Production Demonstration Construction Project, the Construction of Ecological Transition Zone of Beijing, Tianjin and Baoding, River Network Construction, Ecological Function Zone for Zhangcheng Water Conservation, Restoration of Degraded Forest in Zhangjiakou Bashang Area. In 2016, in order to protect the forest land and stop the commercial logging of natural forests, subsidies are provided for state-owned natural forest in accordance with the approved amount of forest approved by the State Forestry Administration, which equal to RMB 1,000 (US\$156) per cubic meter. The management subsidy

for state-owned natural forest is RMB 6 (US\$1) per mu, and the management subsidy for collective and individual natural forest is RMB 15 (US\$2.3) per mu annually.

### (3) Groundwater over-exploitation management

Both the quantity and area of over-exploited groundwater in Hebei account for 1/3 of the total number in the country. Since 2014, the state has initiated groundwater over-exploitation comprehensive management pilot project in Hebei. Clarify water rights, develop water prices and vigorously implement the comprehensive reform of water prices; control the total amount of groundwater, strengthen management and strictly monitor the groundwater exploitation; save local water resources, divert water from other areas, focus on the development of modern water-saving agriculture and increase the alternative water sources; reduce groundwater exploitation and restore groundwater ecology via comprehensive management. In 2014, comprehensive management of groundwater over-exploitation was implemented in 49 countries of 4 cities, with a total investment of RMB 7.49 billion (US\$1.17 billion). In 2015, the pilots were expanded to 63 counties of 5 cities, with a total investment of RMB 8.26 billion (US\$1.29 billion). In 2016, the pilots are expanded to a total of 115 counties (cities, districts) in 9 cities and 2 provincial counties, with a total investment of RMB 8.712 billion (US\$1.36 billion). The pilot projects from 2014 and 2015 had resulted in a reduction of 1.52 billion cubic meters of agricultural groundwater exploitation.

The Pilot Plan for Comprehensive Management of Groundwater Overexploitation in Hebei (2016) clearly states that the government will provide subsidies for groundwater over-exploitation management projects to guide the farmers and agriculture entities to participate in adjusting planting structure and taking water-saving measures actively. On the adjustment of planting mode projects, 500 yuan (US\$78) per mu is provided as subsidies. For dry farming projects, a subsidy of 100 yuan (US\$16) per Mu will be granted. For non-crop alternative projects, a subsidy of 1,500 yuan (US\$234) per mu will be provided, which will continue for 5 years and begins to halve from the second year. For the promotion of the winter wheat water-saving technology, a material subsidy of 75 yuan (US\$11.7) per mu will be granted to water-saving varieties. For the sprinkler irrigation, micro-irrigation, water and fertilizer integration and other efficient water-saving projects, a comprehensive subsidy of 1,500 yuan (US\$234) per mu will be provided (including irrigation measurement facilities). For the pipeline water supply projects, a comprehensive subsidy of 1,500 yuan (US\$234) per mu will be provided (including irrigation measurement facilities). For the pipeline water supply projects, a comprehensive subsidy of 1,500 yuan (US\$7.8) per mu will be provided for the operations of machines.

### (4) Energy saving and emission reduction

In 2012, the 12<sup>th</sup> FYP for Energy Saving and Emission Reduction in Hebei was issued which put forward a series of goals, such as the GDP energy consumption of 2015 should be 18% less than that of 2010. In 2013, the special funds for the prevention and control of air pollution closed down backward production capacity of RMB 490 million (US\$76.6 million). Enterprises and projects with high energy consumption, heavy pollution, backward technologies and overcapacity were shut down, including iron and steel, cement, glass, coal, paper, printing and

dyeing. The year witnessed the elimination of 8347 enterprises, reduction of 7.88 million tons of crude steel capacity, 5.86 million tons of iron, 17.16 million tons of cement, 14.88 million standard weight box of flat glass. The elimination further optimized the economic structure, and reduced the pressure on environmental governance. Vigorously promote the 6643 Project, which is to reduce 60 million tons of steel, 60 million tons of cement, 40 million tons of coal and 30 million standard weight boxes of glass by 2017. Other related projects include the new and old "Double Thirty", "Double Thousand", innovation of key practical technologies in key energy-saving industries, the "Sunday Action" to reduce the excess capacity of steel, and the concentrated operations to reduce the excess capacity of cement. For the special operations including changing fuel from coal to gas, shut down of clay and brick kilns, "chimney demolition" and the elimination of yellow label cars, Hebei (the provincial Department of Finance) provides priority capital incentives to places where the tasks are overfulfilled through financial budget control, which has encouraged and mobilized the enthusiasm of local governments to prevent pollution and ensured that the key annual targets of the provincial government could be achieved on time.

#### (5) Energy structure optimization

To improve the energy mix, while implementing centralized heating, a series of measures have been implemented including changing fuel from coal to natural gas, changing fuel from coal to electricity, promoting the use of clean coal, replacing coal-fired boiler, advocating the use of clean coal, briquette, biomass, solar power, geothermal and other clean forms of energy.

Coal burning is a major source of air pollution. Hebei invested RMB 810 million (US\$126.6 million) in total in 2014 to eliminate in advance or upgrade coal-fired boilers for energy-saving and environmental protection. A subsidy of 20,000 yuan (US\$3,125) per ton of steam at most will be provided to the boilers reaching the second or higher energy efficiency standards after the upgrading, and the subsidy fund for a single project cannot exceed 50% of the total investment. For the coal boilers eliminated through removal, replacement or renewal, a subsidy of 20,000 yuan (US\$3,125) per ton of steam at most will be granted.

Hebei Province started to the implement the coal-fired boiler management in 2015, and by the end of 2017, it aims to complete the phase-out task of 11071 sets of coal-fired boilers. For the remaining 23562 coal-fired boilers, it is intended to ensure a comprehensive upgrading for energy saving and environmental protection with the target of 30%, 30% and 40% by 2015, 2016 and 2017 respectively.

In 2015, through upgrading to ultra-low-emission coal-fired units, shutting down solid clay brick kilns and renovating coal-fired boilers, Hebei reduced 5 million tons of coal consumption. So far 12009 coal-fired boilers have been phased out, the capacity of which equals to nearly 3 million tons of steam. Within built-areas, coal-fired boilers with capacity of or below 10 tons of steam have all been eliminated. 252 low-emission coal-fired units have been completed. 2780 solid clay kilns were shut down, which completely stopped the direct emissions at a low altitude from 2.6 million tons of coals.

The Special Action Plan for Coking Industry Pollution Remediation in Hebei issued in April 2016 proposed to reduce coal production capacity of 6 million tons by the end of the year through transformation to ensure all existing coke production enterprises meet pollutant discharge requirements.

The Special Action Plan for Open Mine Pollution Remediation in Hebei issued in April 2016 proposed in-depth pollution treatment of 1881 open mines within three years. On the basis of returning in proportion the cost of mining rights and governance deposit, by the end of June 2016, the open mines applying for closure will be given appropriate compensation and incentives. For the open mines with certificates that were forced to close their business for violating the laws and regulations, the cost of mining rights and governance deposit will not be returned. Nor will they be compensated.

The Special Action Plan for Scattered Coal Pollution Remediation in Hebei issued in June 2016 proposed comprehensive treatment of the production, circulation and use of scattered coal in the province within three years.

In 2016, the Hebei provincial government promulgated the Guiding Opinions on Accelerating the Change of Fuel from Coal to Electricity and Natural Gas in the Coal-free Zone in Baoding and Langfang. In order to improve the ecological environment and quality of life, by the end of October 2017, realize zero coal burning except for thermal coal, concentrated heating and raw material coal. To spur the change of fuel from coal to electricity and natural gas in the rural areas while taking into account the economic capacity of the public, a series of subsidies will be granted for the countryside changing fuel from coal to electricity and natural gas, including equipment purchase subsidies, electricity and gas subsidies, and being able not to follow the tiered electricity and natural gas pricing. Specifically, equipment purchase subsidies for replacing coal with electricity and natural gas are 85% and 70% respectively, and the maximum amount of subsidies per household should not exceed 7400 yuan, and 2,700 yuan respectively; during the heating period, the subsidy for residential electricity is 0.2 yuan/kWh and the maximum subsidy of electricity quantity for each household is 10,000 kilowatt hours; the natural gas subsidy is 1 yuan/cubic meter and the maximum annual subsidy of gas quantity per household is 1200 cubic meters.

From June 1, 2015, the Decision of People's Congress Standing Committee of Hebei on the Promoting Comprehensive Utilization of Crop Straw and Banning Open Burning started to be implemented. Based on the original special funds of Hebei for banning open crop straw burning, another special funds for the comprehensive utilization of straw was set up, with a focus on grinding straw in a mechanized way and returning it to the field, turning straw silage into fodder, establishing a straw collection and storage service system, promoting biomass stove and resource utilization such as straw gasification and curing molding.

### (6) Energy efficiency improvement

Promote industrial technical transformation and upgrading. In 2013, a total fund of RMB 1.05 billion (US\$164.1 million) was invested in the technical transformation of industrial enterprises

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to provide bank discount and special support for the key transformation and construction projects. During the year, a total of 1124 key transformation and construction projects were promoted, which guided RMB 720 billion (US\$112.5 billion) of industrial investment in technical transformation and promoted the development of strategic emerging industries<sup>40</sup>, traditional enterprises with advantages and modern service industry.

Between 2011-2013, a total of 594 energy saving and emission reduction technology projects from industrial enterprises in Hebei were supported by the national and provincial special funds, including 388 energy-saving emission reduction technical transformation projects for energy saving and emission reduction, 39 key energy management center for industry and enterprises in Hebei, 43 clean production technology demonstration projects, 115 technical transformation projects for energy-saving and environmental protection products. With a total of RMB 2.33 billion (US\$364.1 million) support from national and provincial fundsing, the implementation of these projects effectively alleviated the growing trend of major pollutants industrial emissions of major pollutants, and improved the quality of the environment.

In 2013, the Department of Finance in Hebei raised RMB 56 million (US\$8.75 million) of funds in total, with a focus on supporting 28 enterprises projects to build capacity for innovation. In order to increase the support for the strategic emerging industries, Hebei set up a special fund for strategic emerging industries starting from 2012. The province would provide 1 billion yuan each year as a special fund to support the strategic emerging industries, including key technology research and development, industrialization of high-tech achievements, enhancing innovative capacity, key application demonstration, cultivation of high-growth enterprises, introduction of the large leading projects, industrial innovation and development and regional agglomeration development. In 2013, the provincial budget provided 1.6 billion yuan of special funds for central enterprises to move into Hebei, strategic emerging industries, and development of modern logistics industry. The provincial investment in 2014 reached 4.38 billion yuan of special funds with a focus on the main industrial development. Through financial policy to support the middle and central economic zone of Hebei to develop advanced manufacturing and specific industries and strive to establish an industrial structure with a clear division of labor, complementary advantages, distinctive features as well as coordinated development.

Through the special funds for strategic emerging industries, the special funds for the development of modern logistics industry, special funds for the central enterprises to move into Hebei, Hebei focuses on industries with great market potential, solid industrial base and

<sup>40.</sup> The strategic emerging industries refer to the seven industries of great significance that the central government of China put forward in 2010 to spur the upgrading of industrial structure and transformation of economic development mode, enhance China's independent development capacity and international competitiveness, and promote economic and social sustainable development, including energy efficient and environmental technologies, next generation information technology (IT), biotechnology, high-end equipment manufacturing, new energy, new materials, and new-energy vehicles (NEVs).

leading roles, accelerates the formation of pillar industries, highlights technological innovation and emerging industries development and spurs the transformation of economic development mode.

In 2014, the research and development funds that Hebei invested in the prevention and control of air pollution as well as energy saving and emission reduction reached over RMB 50 million (US\$7.8 million). Furthermore, based on the "135" Project, Hebei has also optimized the allocation of scientific and technological resources inside and outside the province, increased investment in science and technology year by year, implemented a number of major science and technology projects in line with the priorities, and constantly broken through the bottleneck of air pollution control technologies, and provided comprehensive technical support for coal burning reduction, vehicle and oil control, pollution and emission management, and air cleaning as well as dust reduction.

## (7) Comprehensive agricultural development

In recent years, the annual financial investment in Hebei to support food production has continued to increase by almost 30%. In 2013, Hebei issued RMB 6.83 billion (US\$1.07 billion) of grain subsidies; invested RMB 1.738 billion (US\$278.59 million) of funds to support infrastructure construction for farmland water conservancy, which solved the watering problem of 19.09 million mu of farmland; invested RMB 447 million (US\$69.8 million) as agricultural relief funds for disaster rescue and relief, restoration of damaged water conservancy projects, agricultural production relief and facilities reconstruction; granted RMB 1.26 billion (US\$196.9 million) of funds for the fine breeds of wheat, corn, rice, cotton and other crops; provided RMB 1 billion (US\$156.3 million) of subsidies for agricultural machinery purchase; RMB 265 million (US\$41.4 million) of special incentives was issued to 77 advanced grain production counties and cities with the total grain output increasing by over 3.4% in 2011 in order to support grain production. 443 million yuan of provincial subsidy funds was allocated to support the land management projects for comprehensive agricultural development by the central government. RMB 416 million (US\$65 million) of provincial subsidy funds for the key county projects of small agricultural water conservancy was granted to support the central government; RMB 250 million (US\$39.1 million) of provincial funds was arranged to carry out sub-soiling operations for 10 million mu of farmland in the province; RMB 163 million (US\$25.5 million) of county and provincial subsidy funds was granted for modern agricultural projects in the province to support the modern agricultural production and development projects by the central government; RMB 110 million (US\$17.2 million) of central subsidy funds was raised to build high yield agriculture and establish 10,000 mu of demonstration farmland with wheat, corn, soybeans, potatoes and grain.

In 2014, RMB 6.83 billion (US\$1.07 billion) of benefitting-farmer financial subsidies was allocated to cities and counties (of which grain subsidies took up RMB 780 million (US\$121.9 million) and agricultural subsidies RMB 6.05 billion (US\$0.95 billion)), which covered a total area of 78.9 million mu.

In 2015, the central government's comprehensive agricultural development funds reached RMB 2.024 billion (US\$316.25 million). At the same time, loans, discounts, financial subsidies and other means have been adopted to attract social funds actively. The total provincial investment in agricultural development reached RMB 2.748 billion (US\$429.375 million). RMB 50 million (US\$7.8 million) of provincial special funds was arranged to transform, upgrade and construct 100 provincial modern vegetable industry parks. Since January 1, 2016, the proportion of agricultural insurance subsidies for three major food crops, i.e. rice, wheat and corn in the major grain production counties was adjusted: the proportion of central and provincial financial subsidies were increased; the proportion of municipal financial subsidies remained unchanged; the proportion of county financial subsidies were reduced to zero. Since July 1, 2016, Hebei has started pilot insurance subsidies for featured agricultural industries and products.

#### (8) Rural transformation

To promote the integration of urban and rural areas and the equalization of public services, in 2014, Hebei proposed to build 3,000 beautiful villages and fully complete the 15 practical tasks for the transformation and upgrading. Hebei allocated 143 million yuan as provincial subsidy funds for the planning of the main villages, garbage removal and energy-saving renovation of residential houses in pilot villages. Energy-saving special incentive funds were granted to 4417 households from the 10 pilot villages. The standard of the incentives was 5,000 yuan per household and the total amount was RMB 22.085 million (US\$3.45 million).

In 2014, Hebei was identified as a key province for the special fund of the Food Security Project by the central government in order to repair local dangerous and outdated warehouses. Hebei plans to invest RMB 1.2 billion (US\$187.5 million) (of which the central subsidies account for 300 million yuan) to conduct retrofitting and reconstruction of the state-owned grain warehouses in 11 cities and 151 counties (cities, districts).

Since 2015, Hebei has strengthened the support for retrofitting dilapidated houses in poor rural areas. The retrofitting fund for dilapidated rural houses gives priority to the counties where 7366 poor villages are located, while also taking into account the key villages in other counties (cities or districts) working on rural landscape transformation as well as the areas with high-intensity earthquake fortification. As of September 2015, Hebei has allocated RMB 1.6 billion (US\$250 million) of retrofitting funds for dilapidated rural houses, of which the central capital accounted for RMB 1.045 billion (US\$163.3 million) and the provincial matching funds were 558 million yuan. The dilapidated houses of 123,000 households have been retrofitted, of which 30,000 are set as energy-saving model households.

#### (9) Flood prevention and relief

In order to better conduct the flood prevention and relief work and alleviate the impact of "7.19" flood, in 2016, Hebei allocated a total of 2.587 billion yuan from the central and provincial disaster relief funds, which provided a strong financial guarantee for the disaster relief and post-disaster reconstruction and recovery in the disaster-stricken area. RMB 20 million (US\$62.5 million) of the first disaster relief fund was allocated on the night of July 21, 2016.

### 2. Innovative expenditure patterns

#### (1) Public and private partnership

On April 30, 2015, Hebei released the first batch of project list to encourage private investment in traffic, energy, municipal services and other areas. It involved a total of 38 projects on expressway, first-grade highway, railway, clean energy, cogeneration, hydropower generation, military production, medical facilities, as well as urban water supply, heating and sewage treatment, with a total investment of RMB 210.61 billion (US\$32.9 billion) to encourage private capital to participate in project construction and operation through joint ventures, sole proprietorship, equity participation, franchise, and etc. In May 2016, the Hebei Provincial Price Bureau and the Provincial Department of Housing and Urban-Rural Development issued the Opinions on the Implementation of Paid Use System for the Urban Underground Integrated Corridor, requiring all cities to establish and improve the paid use system for the urban underground integrated corridor that will both attract social capital to participate in corridor construction, operation and management, and contribute to mobilizing the enthusiasm of the units along the pipeline to join the corridor construction. The Opinion came into effect on June 1, 2016 and will be valid for 5 years. By the end of 2016, Hebei has 529 projects in reserve with a total investment of more than 1 trillion yuan, among which 42 projects were implemented with an investment of RMB 163.3 billion (US\$25.5 billion).

#### (2) International loans

On December 10, 2015, the Executive Board of the Asian Development Bank (ADB) approved the air pollution control project in Hebei and would provide policy loans worth 300 million US dollars for the Beijing-Tianjin-Hebei Air Quality Improvement - Hebei Policy Reforms Program. This is the first time that ADB has granted policy loans to China. Together with the 150 million euros of joint financing to be provided by the KFW Bankengruppe, the funds will jointly promote the air pollution control in Beijing-Tianjin-Hebei. On June 6, 2016, the Executive Board of the World Bank formally approved the China - Hebei Air Pollution Prevention and Control Program, the loan amount of which is 500 million US dollars with a maturity of 19 years. It is the first World Bank results-oriented loan program in China. After the loan is disbursed, an equity investment fund will be set up together with the \$300 million policy loan from ADB and the 150 million euros from the KFW Bankengruppe to give full play to the guiding and stimulating role of capital and to leverage more social capital to the air pollution prevention and control projects as well as related industries in Hebei.

#### (3) Clean Development Mechanism Fund

The State Council approved the establishment of the China Clean Development Mechanism Fund (CDM Fund) in 2007. Since 2011, Hebei, as one of the earliest province to use the loan, has started the compensatory use of the CDM Fund. By the end of 2014, Hebei has used RMB 595 million (US\$93 million) of preferential loans from the CDM Fund.

#### (4) Emissions trading

In 2013, the Hebei Department of Finance joined hands with the Department of Environmental Protection to vigorously promote emissions trading, actively explore policies on sewage charges for volatile organic compounds and environmental insurance for heavily polluting corporate, and provide guiding funds to promote cleaner production demonstration in the major industries. With these policy supports, enterprises get not only financial support but loan support from financial institutions. In 2013, the 13 enterprises who acquired compensatory emissions permits in the province got RMB 34.448 million (US\$5.38 million) of emission pledge loans provided by the Shijiazhuang Branch of Everbright Bank.

In December 2014, the construction of Beijing-Hebei cross-regional carbon emissions trading market started. The market will establish a cross-regional unified accounting method, verification standard and trading platform to explore the implementation of the carbon emissions trading system and establish a unified carbon market in the country. The cross-regional carbon emissions trading market adopts the quota trading mechanism under the control of the total amount of carbon dioxide emissions, and the trading products include carbon emission quotas and certified emission reductions (emission reduction from Certified Emission Reduction, energy-saving projects and forestry carbon sequestration projects). The trade subjects in the two cities can buy and sell emission quotas and certified emission reductions freely which can be used for compliance.

ON C	Related government bodies	Main responsibilities in tackling climate change	Related divisions
-	Hebei Provincial Development and Reform Commission	<ul> <li>- Develop planning and policy measures for circular economy, and coordinate the implementation; participate in the preparation of environmental protection industries and cleaner production; lead the province's strategies, planning and related policies for tracking climate change, and organize the implementation of the province's strategies, planning and related policies for tracking climate change, and organize the implementation of the province's strategies, planning and related policies for tracking climate change, and organize the implementation of the province's strategies, planning and related policies for tracking climate change, and organize the implementation of the province's strategies, planning and related policies for the leading work team on tackling climate change, energy conservation and emission reduction; guide the promotion of bulk cement and ural areas, ecological environment.</li> <li>Organize the development of agriculture and rural areas, ecological environment construction;</li> <li>Coordinate the convergence between the energy &amp; transportation development planning and the national economic and social development planning.</li> <li>Coordinate the convergence between the energy &amp; transportation development planning and the national economic and social development planning.</li> <li>Coordinate the convergence between the energy &amp; transportation development planning and the national economic and social development planning.</li> <li>Coordinate the convergence between the energy &amp; transportation development and reform; sarticipate in the preparation of sugressive analysis of the coordinated development, major issues in energy development and reform; participate in the preparation of sugressive and plansing.</li> <li>Conduct comprehensive analysis of the total energy consumption control, guide and supervision;</li> <li>Conduct comprehensive analysis of the total energy consumption control, guide and supervision;</li> <li>Conduct comprehensive and policies of the transpirate in the pre</li></ul>	lackling climate change Division, Rural Economy Division, Basic Industry Division, General Section of the Energy Bureau, New Energy Bureau, New Market Supervision Division of the Energy Bureau.

Government bodies related to climate change in Hebei

**Annex II. Related government bodies** 

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Taxation Division, Social Security Division, Resource and Environment Division, Economic Development Division, Budget Bureau, Agriculture Division, PPP Office, Procurement Office,	Vehicle Air Pollution Control Division, Air Pollution Prevention and Control Division, Water Pollution Control Division, Rural Environmental Monitoring and Emergency Response Division, Radiation Safety Management Dvision (Nuclear Safety Management
<ul> <li>Comprehensively manage national fiscal revenue and expenditure, fiscal and taxation policies, implement financial supervision and participate in the macro-control of national economy.</li> <li>Establish management system for the loans (donation) from international financial organizations, foreign governments and clean development trust; responsible for the application and lending of loan (donation) from international financial organizations, foreign governments and clean development trust; responsible for the application and lending of loan (donation) from international financial organizations, foreign governments and clean development trust as well as fund use, repayment and statistics; undertake foreign economic cooperation and exchanges.</li> </ul>	<ul> <li>Establish and improve the core system of environmental protection. Formulate and organize the implementation of the province's environmental protection policies and planning, and draft local laws and regulations. Develop and supervise the implementation of pollution prevention prevention planning for the provincial government, join hands with the requirements of the provincial government, join hands with the relevant departments to develop pollution control planning for key sea areas and watershed, as well the environmental protection planning for thrinking water source. In line with the requirements of the provincial government, join hands with the main functional zoning in the province;</li> <li>Coordinate and supervise major environmental issues. Take the lead in coordinating the investigation and handling of major environmental pollution and ecological damage accidents in the province, guide and coordinate the municipal and county governments in the emergency response and early warning for major environmental protection work;</li> <li>Undertake the responsibility to implement the province is questive marine environmental protection work;</li> <li>Undertake the responsibility to implement the province is emission reduction targets. Establish and oversee the implementation of the mechanism for major pollutant discharge control and environmental protection work;</li> <li>Propose opinions on the scale and direction of fixed assets investment in the field of environmental protection as well as on provincial fiscal fund arrangement, participate in guiding and promoting the development of circular economy and environmental protection industry in the province, and participate in tackling climate conomy and environmental protection industry in the province, and participate in tackling climate conomic and environmental protection industry in the province, and participate in tackling climate conomic and environmental protection industry in the province, and participate in tackling climate conomic and environm</li></ul>
Hebei Provincial Department of Finance	Hebei Provincial Department of Environmental Protection
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- Su	upervise and manage environmental pollution prevention and control. Formulate the pollution prevention and control	Division), Total
mai	anagement system for water, atmosphere, soil, noise, light, malodor, solid waste, chemicals and motor vehicles and	Pollutant Discharge
imp	plement it; supervise and manage the environmental protection work for drinking water sources in conjunction with	Control Division,
the	e relevant departments; and organize and guide urban and rural comprehensive environmental remediation work;	Policy and
- Cl	uide, coordinate and supervise the ecological protection work. Formulate ecological protection planning, organize	Regulation Division
dna	ality assessment for ecological environment, and supervise the development and utilization of natural resources which	
hav	ve effect on the ecological environment, the construction of key ecological environment and ecological restoration	
MOI	ork. Guide, coordinate and supervise the environmental protection work of various types of nature reserves, scenic spots	
and	d forest parks; coordinate and supervise the protection of wild animals and plants, wetland environmental protection	
and	d desertification control work. Coordinate and guide the protection of rural ecological environment; supervise the	
env	vironmental safety of biotechnology; lead the work of biological species (including genetic resources); organize and	
COO	ordinate biodiversity conservation;	
- Re	esponsible for environmental monitoring and information dissemination. Develop environmental monitoring	
me	echanism and regulations; organize and implement the monitoring of environmental quality and pollution sources.	
Org	ganize investigation and evaluation of the environmental quality and issue forecast and early warning; organize the	
esta	tablishment and management of provincial environmental monitoring network and information network; establish and	
imp	plement environmental quality notice system; release the province's comprehensive environmental report and major	
env	vironmental information;	
- CO	onduct environmental protection science and technology work; organize scientific research and technical engineering	
den	monstration on environmental protection; promote the construction of environmental technology management system;	
- CO	onduct international cooperation and exchanges on environmental protection; put forward suggestions for relevant	
issu	ues in international and inter-provincial environmental cooperation; organize and coordinate the implementation	
of ir	international treaties on environmental protection; and participate in the handling of foreign-related environmental	
bro.	otection affairs;	
- Or	brganize, guide and coordinate environmental education and publicity work; formulate and organize the	
imp	plementation of environmental protection publicity and education program; carry out publicity and education work	
	e-congreat civilization. כמו את מרגוסו מות בוויזויסו וווברוריוובותטן אסרובוץ כמו את מרגוסו, מות מיניטוב נווב משטר מות אסרומו ממולמלוסהs to participate in environmental protection.	

Energy Conservation and Comprehensive Utilization Division	Afforestation Management Division, Forest Resources Management and Policy Regulations Division, Development Management Division
The division is mainly responsible for the formulation and implementation of the province's industrial energy conservation and comprehensive utilization of resources and cleaner production promotion policies; participating in the development of planning for energy conservation and comprehensive utilization of resources, cleaner production promotion and pollution control policies; proposing opinions on the energy and water consumption of the industrial sector that needs approval of the provincial government; organize and guide the industrial energy-saving equipment (product) manufacturing and enterprises' energy management; organize and coordinate major demonstration projects and the promotion of new products, new technologies, new equipment, and new materials; study, formulate and implement policies on the comprehensive utilization of resources and project management policies on the comprehensive utilization of resources.	<ul> <li>Organize, coordinate, guide and supervise the afforestation work in the province. Develop guiding plan for afforestation in the province to guide the control of soil erosion through biological measures including afforestation, forest conservation and planting trees and support afforestation work. Undertake forestry related work on tackling climate change;</li> <li>Undertake the responsibility to supervise and manage the protection and development of forest resources in the province;</li> <li>Organize, coordinate, guide and supervise the wetland protection and development of forest resources in the province;</li> <li>Organize, coordinate, guide and supervise the wetland protection and development of forest resources in the province;</li> <li>Organize, coordinate, guide and supervise the wetland protection work in the province. Organize and implement the protection planning as well as local standards and regulations for wetland protection, organize and implement the protection and management work including the construction of wetland protection; organize and supervise tational use of wetlands;</li> <li>Organize, coordinate, guide and supervise the rational use of desertification and the province. Under the guidance of national protection implement the province interverses construction; supervise the rational use of forestry system in the province. Under the guidance of national and protection fallon desertification, and organize and guide the forestry variance and guide the forestry variance and subervise the relevent of forestry burdeneon the nanagement of forestry supervise the relovance).</li> <li>Supervise and manage the formulation of forestry and supervise and supervise and supervise and guide the resteres of national and reserves of forestry system in the province. Under the guidance of national and protection nand management of nature reserves of forestry supter on the province on the formulation of forest, wetland, desertification and supervise the evelopment and updise and supervise and guide t</li></ul>
Hebei Provincial Department of Industry and Information Technology	Hebei Provincial Department of Forestry
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Beautiful Village Construction Division, Modern Agriculture Park Division (Mountainous Area Comprehensive Development Office), Agricultural Resources and Environment Division		Urban Construction Division, Construction Material and Equipment Division
<ul> <li>Responsible for the protection of agricultural resources. Guide the protection, management and efficient use of agricultural land, fishery waters, grassland, agriculture-suitable tidal flat, agriculture-suitable wetlands and agricultural biological species resources;</li> <li>Develop and implement construction planning for eco-agriculture and renewable energy. Guide the comprehensive development and utilization of agricultural resources and rural renewable energy, agricultural biomass industry development, and rural energy saving and emission reduction; undertake agricultural non-point source pollution control; designate areas where agricultural production is prohibited; guide the development of ecological agriculture and circular agriculture; protect the ecological environment of fishery waters.</li> </ul>	<ul> <li>In the administrative area, organize cross-regional and cross-sectoral joint monitoring and forecast for major disastrous weather, timely propose meteorological disaster prevention measures, and conduct assessment on major meteorological disasters, with the aim to provide decision-making basis for the government to prepare against the meteorological disasters; manage the public meteorological services in the administrative area; manage the release of professional meteorological forecast in the administrative area including public weather forecast, disastrous weather warning, agricultural weather forecast, meteorological forecast, disastrous weather warning, agricultural weather forecast, meteorological forecast of the urban environment and meteorological forecast of the fire danger rating.</li> <li>Propose suggestions to the people's governments and relevant departments at the same level to utilize and protect climate resources and to promote climate resources zoning and other achievements; organize climate feasibility studies for climate resources development and utilization projects; participate in the tackling climate change work by the provincial government; organize and conduct climate change impact assessment, technology development and decision-making advisory services.</li> </ul>	<ul> <li>Develop the long-term planning, reform measures, rules and regulations and technical standards for urban construction and municipal public utilities; guide the urban water supply, water saving, gas, heat, municipal facilities, gardens, city environment management, urban construction monitoring, water security supervision of urban landscape and other work; guide the construction of urban sewage treatment facilities and supporting pipe network; guide the construction of harmless disposal of urban garbage and supporting facilities; guide the greening of urban planning areas; review, approve, supervise and manage the scenic spots above provincial level.</li> <li>Formulate policies and development plans for the construction machinery and equipment industry and supervise the implementation; guide the renovation of wall materials;</li> <li>Guide and standardize the construction machinery and equipment industry and supervise the implementation; guide the construction machinery and equipment that are under elimination, restriction or promotion; guide and manage the use of energy-saving construction materials and products.</li> </ul>
Hebei Provincial Department of Agriculture	Hebei Provincial Meteorological Bureau	Hebei Provincial Department of Housing and Urban- Rural Development
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σ	Hebei Provincial	- In accordance with the relevant laws, regulations and standards of national resources and environmental protection,	Water Resource
	Department of	develop water resources protection planning; organize water functional area zoning and water discharge control of	Division, Water
	Water Resources	different functional areas; monitor the water quantity and quality in rivers, lakes and reservoirs, examine the assimilative	Protection Divi
		capacity of the watershed, and propose opinions on the limit of total discharge volume.	
		- Develop economic regulation measures for the province's water conservancy industry; conduct macro-adjustment of	
		the use of water resource fund; guide the water supply industry, hydropower and other businesses; implement national	
		policies on the assets, pricing, tax, credit and finance of water conservancy, and coordinate with relevant departments	
		to develop the province's policy measures and organize the implementation; in line with relevant national provisions,	
		supervise and manage state-owned assets in the water conservancy system.	
		- Organize the implementation of water resources abstraction permit, water resources paid use system and water	
		resources demonstration system; organize water resources survey, evaluation and monitoring; guide and supervise the	
		implementation of water allocation, water function zoning and water resources dispatch; organize the formulation of	
		water resources protection planning; guide the protection of drinking water sources, urban water supply planning, urban	
		flood prevention, urban sewage treatment and other non-traditional water resources development work; guide the setup	
		of the sewage outlets to the river; guide the planned water use and water conservation work.	

Source: Consolidated data from the website of Hebei Provincial Government and field survey

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# Annex III. The main contents of budget management reform in Hebei

#### 1. Improve government budget system

(1) Implement overall budget management. Include all the revenue and expenditure of the provincial government in the budget management. Based on a clear scope of revenue and expenditure, prepare general public budget<sup>41</sup>, government fund budget<sup>42</sup>, state capital operating budget<sup>43</sup> and social insurance fund budget<sup>44</sup>, and establish a government budget system with clear positioning and division of labor. Government fund budget, state capital operating budget, social insurance fund budget are linked with general public budget.



The four types of budget have different focuses, and fiscal expenditure on tackling climate change is included in the general public budget. Thus, the following analysis primarily targets relevant expenditures in the general public budget.

<sup>41.</sup> General public budget is the fiscal revenue with tax revenue as the main part, which is used to protect and improve of people's livelihood, promote economic and social development, safeguard national security, maintain the normal operation of national institutions and others.

<sup>42.</sup> The government fund budget is the fund levied, collected or raised in other ways from specific objects within a certain period of time in accordance with the provisions of laws and administrative regulations, which is specially used for budget for revenues and expenditures for the development of specific public utilities. From January 1, 2015, among the government fund budget, the project revenue and expenditure for the provision of basic public services and the operation of personnel and institutions will be integrated into the, general public budget including local education surtax, cultural undertakings construction fees, employment insurance fund for the disabled, funds from the provisions of local land transfer for farmland and water conservancy construction as well as education, income from transfer of road toll right for government loan repayment, afforestation fund, expenditure for forest vegetation restoration, the water conservancy construction fund, harbor dues, and channel maintenance fee for Yangtze estuary.

<sup>43.</sup> The state capital operating budget is the revenue and expenditure from the state capital gains. The state capital operating budget is prepared in accordance with the principle of balance of payments without deficit, and transfers funds to the general public budget. In addition to transferring fund to the general public budget and supplementary social security fund, the budget is limited to solving the historical problems and reform costs of state-owned enterprises, capital injection for state-owned enterprises and policy subsidies. The funds of general public budget for these aspects will withdrawal gradually.

<sup>44.</sup> Social insurance fund budget is the fund from social insurance contributions, general public budget arrangements and fund collected from other means, which is specially devoted to the revenues and expenditures of social insurance. Social insurance fund budget is prepared in accordance with the overall level and social insurance projects, and should ensure balance of payments.

(2) Strengthen coordination among government funds, state capital operating budget and general public budget. In accordance with the central deployment, gradually abolish the regulations of special funds for special purpose, including urban maintenance and construction tax, sewage charges, cost of prospecting and mining rights, and compensation for mineral resources. The relevant funds will be arranged from the general public budget. Allocate the budget in a unified way, and gradually include all the budget funds into the financial sector for overall arrangement.

(3) Strengthen the overall consideration and arrangement of funds between the corresponding level and the next higher level. Hebei provincial government prepares the budget at the beginning of the year, includes transfer payments at higher level such as tax returns at the higher level, revenue collected from the lower level, those listed in the base and noticed in advance, and the revenue of the corresponding level into the revenue budget, and allocate the expenditure of the corresponding level and payment to lower level in a manner of overall consideration and arrangement.

(4) Improve the budget standard system. Hebei Province gives full play to the basic supporting role of expenditure standards in budget preparation and management, perfects the quota standard system for basic expenditures, improves the quota and service standards for institutional operating funds, and speed up the establishment of the quota standard system for project expenditure. Establish a dynamic adjustment mechanism for the quota standards, and make appropriate adjustment based on economic and social development as well as policy changes. Strengthen the staffing and asset management and improve the mechanism that integrates staffing management, asset management and budget preparation. Establish information base for departmental budget, and enhance the budget management foundation for basic expenditure.

### 2. Improve budget control methods

### (1) Adopt medium-term financial planning and management

Starting from the preparation of the 2016 budget, Hebei Province has been formulating the mid-term financial planning. According to the economic operation as well as the direction of macro-control, provide scientific forecast of the fiscal revenue in the next three years, make a comprehensive combing analysis of the major reforms and expenditure policies, prepare a 3-year rolling financial planning of the corresponding level in a manner of overall consideration and arrangement, and link up with the local economic & social development plan and national macro-control policies. The preparation of annual budget is linked to the medium-term financial plan. A department at any level, when formulating departmental and industrial planning that involve policy and financial support, should link with and the medium-term financial planning. Strengthen the construction of the budget item base, improve the project reporting and audit mechanism, and achieve the rolling management of budget items.

### (2) Establish multiyear budget balance mechanism

Hebei Province has set budget stability adjustment funds for the general public budget at any level to make up for the deficiency of future budget funds. If there is any excess revenue while implementing the general public budget, it will be used for government debt or supplementary stability adjustment funds; if there is revenue deficiency, realize balance through transferring the budget stability adjustment funds or other budget funds or reducing expenditure. If balance still could not be achieved with the above measures, increase the deficit at the provincial level with the approval by the Provincial People's Congress or its Standing Committee, and report to the Ministry of Finance for the record, in the next year to make up for the budget; cities and counties can achieve balance by applying for temporary assistance from government at higher levels, and return the funds in the next year's budget. Excess revenue in government fund budget or state capital operating budget will be carried forward to the next year; if there is revenue deficiency, achieve balance by reducing expenditure.

## 3. Deepen performance budget reform

### (1) Comprehensively promote performance budget reform

Opinions of Hebei Provincial People's Government on Deepening the Performance Budget Management Reform (Ji Zheng [2014] NO.76) requires to speed up the establishment of a new mechanism of whole-process performance budget management. In 2015, fully implemented at the corresponding levels of 11 cities divided into districts and Dingzhou as well as Xinji, and three counties (cities or districts) were selected for simultaneous pilot project; in 2016, the policy was implemented in all cities and counties (cities or districts) in the province.

### (2) Improve budget review methods

When financial departments at any level in Hebei review budget, firstly, they review whether departmental responsibilities and objectives match with government work; secondly, review whether the indicators for the performance objectives of all the work are scientific; then review the relevance between the budget items and the responsible activities as well as the necessity of the project; finally define a reasonable budget limit to ensure the overall implementation of major government decision-making arrangements and enhance government management efficiency.

## (3) Fully promote performance evaluation

Hebei Province adopts the integrated method of self-assessment and financial evaluation to conduct comprehensive performance evaluation. Departments at any level are responsible for conducting performance evaluation of budget items and comprehensive self-evaluation of the annual completion; the financial departments are responsible for conducting performance evaluation of work activities and re-evaluating the key areas and major projects. According to the budget management needs, expand the scope of performance evaluation, innovate performance evaluation methods, and extend the priorities of performance evaluation from project expenditure to departmental expenditure, policies, systems and management.

#### (4) Strengthen the application of evaluation results

Hebei Province has established a mechanism to link budget performance with budget arrangements, and has taken the performance evaluation results as an important evidence for adjusting expenditure structure and improving the fiscal policies as well as scientific budget arrangements. Improve the performance evaluation reporting system and performance accountability system, and enhance the disclosure of performance information.

### 4. Improve financial input methods

#### (1) Increase government purchase of services provided by social forces

Hand public services that are suitable for market-based approach and can be undertaken by social forces to qualified social forces in accordance with certain methods and procedures, and governments will pay the cost based on the quantity and quality of services. For all management services of government affairs that are suitable to purchase from social forces should, in principle, introduce a competition mechanism, purchase through contract or commission, and incorporate into the scope of administration of services purchased by government from social forces.

#### (2) Vigorously promote the public and private partnership model (PPP model)

Hebei Province encourages social capital to participate in the investment and operation of public services with certain benefits such as urban infrastructure through franchising, etc. For construction projects with quasi-public nature that have relatively flexible price adjustment mechanism, high degree of marketization, large scale of investment as well as long-term and stabile needs, explore the application of PPP model and leverage social capital to participate in supplying public goods.

### (3) Implement subsidies after evaluation

For the science and technology development and service projects that governments support and encourage, adjust from the original subsidies in advance to the method that the institutions invest first, after gaining achievement or service performance, the financial and relevant departments review or evaluate the performance, and then provide subsidies in order to utilize the guiding role of financial funds.

#### (4) Actively promote equity investment

Manage various types of financial resources that governments provide to support industrial development in a manner of overall consideration and arrangement; establish equity investment funds to guide the industries; take the market approach to attract social capital to support economic and industrial restructuring and upgrading; form a capital investment mechanism that integrates fiscal and financial means.

# Annex IV. Correlation between the classification of general public budget expenditure items and climate (detailed)

Item NO.	ltem	High Correlation	Moderate Correlation	Low Correlation
20104	Development and reform affairs			
2010401	Administrative operation			
2010402	General administrative affairs			
2010404	Strategic planning and implementation			
2010408	Price management			
2010450	Cause operation			
2010499	Other development and reform expenditure			
20105	Statistical information affairs			
2010501	Administrative operation			
2010505	Special statistical business			
2010506	Statistical management			
2010507	Special census activities			
2010508	Statistical sampling survey			
2010550	Cause operation			
20106	Financial affairs			
2010601	Administrative operation			
2010602	General administrative affairs			
2010603	Organ service			
2010604	Budget reform business			
2010605	Financial treasury business			
2010606	Financial supervision			
2010650	Cause operation			
2010699	Other fiscal expenditures			
2040299	Other public security expenditures			
20601	Science and technology management affairs			
2060101	Administrative operation			
2060102	General administrative affairs			
2060103	Organ service		2/	
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2060199	Other expenditures on science and technology management		√ √	
20602	Basic research			
2060201	Institutional operation			
2060203	Natural science fund			
2060204	Key laboratories and related facilities			
2060206	Special basic research			
2060299	Other basic research expenditures			
20603	Applied research			
2060301	Institutional operation			
2060302	Social welfare research			
2060399	Other applied research expenditures			
20604	Technical research and development			
2060401	Institutional operation			
2060402	Application technology research and development			
2060403	Industrial technology research and development			
2060404	Transformation and diffusion of scientific and technological achievements			
2060499	Other technical research and development expenditure			
20605	Technical conditions and services			
2060501	Institutional operation			
2060503	Technical conditions special projects			
2060599	Other technical conditions and service expenditures			
20606	Social science			
2060601	Social science research institutions			
2060602	Social science research		$\checkmark$	
20607	Popularization of science and technology		$\checkmark$	
2060701	Institutional operation			
2060702	Science popularization activities			

2060703	Youth science and technology activities			
2060704	Academic exchange activities			
2060705	Science and technology museum			
2060799	Other science and technology popularization expenditures			
20608	Science and technology exchange and cooperation			
2060801	International exchange and cooperation			
2060899	Other expenditures on science and technology exchange and cooperation			$\checkmark$
20699	Other science and technology expenditures			
2069901	Science and technology awards			
2069999	Other science and technology expenditures			
21101	Environmental protection management affairs		$\checkmark$	
2110101	Administrative operation			
2110102	General administrative affairs			
2110103	Organ service			
2110104	Environmental protection publicity			
2110199	Other environmental protection management expenditures			
21102	Environmental monitoring and supervision			
2110203	Construction Project EIA Review and Supervision			
2110204	Nuclear and Radiation Safety Supervision			
21103	Pollution prevention and control			
2110301	Atmosphere			
2110304	Solid waste and chemicals			
2110305	Radioactive sources and radioactive waste supervision	$\checkmark$		
2110307	Expenditure on sewage charges			
2110399	Other pollution prevention and control expenditures			

21104	Natural ecological protection		
2110401	Ecological protection		
2110402	Rural environmental protection		
2110403	Nature reserve		
21110	Energy saving and utilization		
2111001	Energy saving and utilization		
21111	Pollution reduction		
2111101	Environmental monitoring and information		
2111102	Environmental law enforcement supervision	$\checkmark$	
212	Urban and rural communities expenditure		
21201	Urban and rural communities management affairs		
2120101	Administrative operation		
2120105	Formulation and supervision of engineering construction standards		$\checkmark$
2120106	Engineering construction management		
2120107	Municipal public sector market supervision		
2120108	Planning and protection of key national scenic spots		
2120109	Housing Construction and Real Estate Market Supervision		
2120110	Professional qualification registration and review		
2120199	Other expenditures on urban and rural communities management		
21202	Planning and management of urban and rural communities		
2120201	Planning and management of urban and rural communities		
21203	Public facilities of urban and rural communities		
2120399	Other public facilities expenditures of urban and rural communities		

21205	Environmental health of urban and rural communities		
2120501	Environmental health of urban and rural communities		
21206	Construction market management and supervision		
2120601	Construction market management and supervision		$\checkmark$
213	Agriculture, forestry and water resources expenditure		
21301	Agriculture		
2130101	Administrative operation		
2130102	General administrative affairs		
2130103	Organ service		$\checkmark$
2130104	Cause operation		
2130106	Science and technology transformation and promotion services		
2130108	Pest control		
2130109	Quality safety of agricultural products		
2130110	Law enforcement supervision		
2130111	Statistical monitoring and information services		
2130112	Agricultural industry management		
2130119	Disaster prevention and relief		
2130122	Agricultural means of production and technical subsidies		
2130123	Agricultural production insurance subsidy		
2130124	Institutionalized and industrialized agriculture management		
2130125	Processing and marketing of agricultural products		$\checkmark$
2130126	Rural public welfare undertakings		
2130135	Protection, restoration and utilization of agricultural resources	$\checkmark$	
2130152	Subsidies for college graduates to work at the grassroots		

2130153	Expenditure on grassland vegetation restoration		
2130199	Other agricultural expenditures		
21302	Forestry		
2130201	Administrative operation		
2130203	Organ service		
2130204	Forestry institutions		
2130205	Forest cultivation		
2130206	Promotion of forestry technology		
2130207	Forest resource management		
2130208	Forest resource monitoring		
2130209	Compensation for forest ecological benefit		
2130211	Animal and plant protection		
2130213	Forestry law enforcement and supervision		
2130216	Forestry quarantine and inspection		
2130217	Sand prevention and control		
2130218	Forestry quality and safety		
2130219	Forestry engineering and project management		
2130221	Forestry industrialization		
2130224	Forestry policy development and publicity		
2130233	Forest insurance subsidy		
2130234	Forestry disaster prevention and reduction		
2130299	Other forestry expenditures		
21303	Water conservancy		
2130301	Administrative operation		
2130303	Organ service		
2130304	Business management of water conservancy industry		
2130305	Construction of water conservancy projects		

2130306	Operation and maintenance of water conservancy projects		
2130309	Water law enforcement supervision		
2130310	Soil and water Conservation		
2130311	Water resources conservation management and protection		
2130313	Hydrological forecasting		
2130314	Flood prevention		
2130315	Drought prevention		
2130316	Farmland water conservancy		
2130317	Water technology promotion		
2130331	Expenditure on water resources arrangements		
2130399	Other water expenditures		
21304	South-to-North water diversion		
2130401	Administrative operation		
2130405	Policy research and information management		
2130407	Preliminary work		
2130408	South-to -North water diversion technology promotion		
2130499	Other South-to-North water diversion expenditures		
21305	Poverty alleviation		
2130501	Administrative operation		
2130550	Poverty alleviation institutions		
2130599	Other poverty alleviation expenditures		
21306	Comprehensive agricultural development		
2130601	Institutional operation		
2130602	Land management		$\checkmark$
2130603	Industrialized management		
2130699	Other agricultural development expenditure		$\checkmark$
21399	Other agriculture, forestry and water resources expenditures		

2139999	Other agriculture, forestry and water resources expenditures		
214	Transportation expenses		
21401	Highway and waterway transportation		
2140101	Administrative operation		
2140102	General administrative affairs		
2140104	New road construction		
2140105	Road reconstruction		
2140106	Road maintenance		
2140108	Road administration		
2140112	Road transportation management		
2140113	Road passenger and freight station (field) construction		
2140123	Channel maintenance		
2140127	Ship inspection		
2140131	Maritime management		
2140136	Waterway transportation management expenditure		
2140199	Other highway and waterway transportation expenditures		
21402	Railway transportation		
2140206	Railway safety		
2140208	Industry regulation		
2140299	Other railway transportation expenditures		
21403	Civil air transport		
2140301	Administrative operation		
2140302	General administrative affairs		
2140304	Airport construction		
21499	Other transportation expenditures		
2149999	Other transportation expenditures		
215	Resource exploration information and other expenditures		
21501	Resource exploration and development expenditures		

2150199	Other resources exploration expenditures		
21605	Tourism management and service expenditure		
2160501	Administrative operation		
2160502	General administrative affairs		
2160504	Tourism promotion		
2160505	Tourism industry business management		
2160599	Other tourism management and service expenditures		
21999	Other expenditures		
	Land, marine and meteorology weather and other expenditures		
	Land resources affairs		
2200101	Administrative operation		
2200103	Organ service		
2200107	Social services on land resources		
2200108	Land resources industry business management		
2200113	Investigation of geological and mineral resources		
2200120	Expenditure on special income of mineral resources		
2200150	Cause operation		
2200199	Other land resources expenditure		
22002	Marine management affairs		
2200208	Marine law enforcement supervision		
2200214	Marine use charges		
2200217	Uninhabited island use charge		
2200250	Cause operation		
22003	Mapping affairs		
2200301	Administrative operation		
2200304	Basic mapping		
2200305	Aerial photography		
2200350	Cause operation		

2200399	Other surveying and mapping affairs expenditures		
22004	Earthquake affairs		
2200404	Earthquake monitoring		
2200405	Earthquake forecasting		
2200406	Earthquake prevention		
2200407	Earthquake emergency rescue		
2200450	Earthquake industrial institutions		
2200499	Other earthquake expenditures		
22005	Meteorological affairs		
2200504	Meteorological institutions		
2200509	Meteorological services		
2200510	Maintenance of meteorological equipment		
2200599	Other meteorological expenditures		

#### Annex V. Detailed items of general budget expenditure classified based on correlation with climate change mitigation and adaptation

### Table 1 Detailed items of general budget expenditure with high climate correlation classifiedbased on correlation with climate change mitigation and adaptation

		Mitigation			Adaptation		
Item NO.	ltem	High Correlation	Moderate Correlation	Low Correlation	High Correlation	Moderate Correlation	Low Correlation
21102	Environmental monitoring and supervision				$\checkmark$		
2110203	Construction Project EIA Review and Supervision						
2110204	Nuclear and radiation safety				$\checkmark$		
21103	Pollution prevention and control						
2110301	Atmosphere						
2110304	Solid waste and chemicals						
2110305	Radioactive sources and radioactive waste supervision						
2110307	Expenditure on sewage charges	$\checkmark$					
2110399	Other pollution prevention and control expenditures						
21104	Natural ecological protection						
2110401	Ecological protection						
2110402	Rural environmental protection						
2110403	Nature reserve						
21110	Energy saving and utilization						
2111001	Energy saving and utilization	$\checkmark$					
21111	Pollution reduction	$\checkmark$					
2111101	Environmental monitoring and information						

2111102	Environmental law enforcement supervision	$\checkmark$			
2130119	Disaster prevention and relief	$\checkmark$			
2130135	Protection, restoration and utilization of agricultural resources				
21302	Forestry	$\checkmark$			
2130201	Administrative operation	$\checkmark$			
2130203	Organ service	$\checkmark$			
2130204	Forestry institutions	$\checkmark$			
2130205	Forest cultivation	$\checkmark$			
2130206	Promotion of forestry technology				
2130207	Forest resource management	$\checkmark$			
2130208	Forest resource monitoring	$\checkmark$			
2130209	Compensation for forest ecological benefit				
2130211	Animal and plant protection	$\checkmark$			
2130213	Forestry law enforcement supervision				
2130216	Forestry quarantine and inspection	$\checkmark$			
2130217	Sand prevention and control	$\checkmark$			
2130218	Forestry quality and safety	$\checkmark$			
2130219	Forestry engineering and project management	$\checkmark$			
2130221	Forestry industrialization	$\checkmark$			
2130224	Forestry policy development and publicity				
2130233	Forest insurance subsidy	$\checkmark$			
2130234	Forestry disaster prevention and reduction	$\checkmark$			
2130299	Other forestry expenditures				

2200406	Earthquake prevention			
2200407	Earthquake emergency rescue			
22005	Meteorological affairs			
2200504	Meteorological institutions			
2200509	Meteorological services			
2200510	Maintenance of meteorological equipment			

## Table 2 Detailed items of general budget expenditure with moderate climate correlation classifiedbased on correlation with climate change mitigation and adaptation

			Mitigation	1	Adaptation		
Item NO.	ltem	High	Moderate	Low	High	Moderate	Low
		Correlation	Correlation	Correlation	Correlation	Correlation	Correlation
20104	Development and reform affairs						
2010401	Administrative operation						
2010402	General administrative affairs						
2010404	Strategic planning and implementation						
2010408	Price management					$\checkmark$	
2010450	Cause operation					$\checkmark$	
2010499	Other development and reform expenditures					$\checkmark$	
20602	Basic research						
2060201	Institutional operation					$\checkmark$	
2060203	Natural science fund						
2060204	Key laboratories and related facilities					$\checkmark$	
2060206	Special basic research						
2060299	Other basic research expenditures						
21101	Environmental protection management affairs					$\checkmark$	

2110101	Administrative operation				
2110102	General administrative affairs			$\checkmark$	
2110103	Organ service			$\checkmark$	
2110104	Environmental protection publicity				
2110199	Other environmental protection management expenditures				
2120108	Planning and protection of key national scenic spots				
21202	Planning and management of urban and rural communities				
2120201	Planning and management of urban and rural communities				
21203	Public facilities of urban and rural communities				
2120399	Other public facilities expenditures of urban and rural communities				
21205	Environmental health of urban and rural communities				
2120501	Environmental health of urban and rural communities				
21303	Water conservancy				
2130301	Administrative operation			$\checkmark$	
2130303	Organ service			$\checkmark$	
2130304	Business management of water conservancy industry				
2130305	Construction of water conservancy projects				
2130306	Operation and maintenance of water conservancy projects				
2130309	Water law enforcement supervision				
2130310	Soil and water conservation				
2130311	Soil and water conservation				

2130313	Hydrological forecasting				
2130314	Flood prevention				
2130315	Drought prevention				
2130316	Farmland water conservancy				
2130317	Water technology promotion	$\checkmark$			
2130331	Expenditure on water resources arrangements				
2130399	Other water expenditures				
21304	South-to-North water diversion				
2130401	Administrative operation			$\checkmark$	
2130405	Policy research and information management				
2130407	Preliminary work			$\checkmark$	
2130408	South-to-North water diversion technology promotion				
2130499	Other South-to-North water diversion expenditures				
21402	Railway transportation				
2140206	Railway safety	$\checkmark$			
2140208	Industry regulation			$\checkmark$	
2140299	Other railway transportation expenditures				

# Table 3 Detailed items of general budget expenditure with low climate correlation classified basedon correlation with climate change mitigation and adaptation

			Mitigatior	1	Adaptation		
Item NO.	Item	High	Moderate	Low	High	Moderate	Low
20105	Statistical information affairs	Correlation	Correlation	Correlation	Correlation	Correlation	
2010501	Administrative operation						v v
2010505	Special statistical business						v v
2010506	Statistical management						v v
2010507	Special census activities						v v
2010508	Statistical sampling survey						v v
2010550	Cause operation						v V
20106	Financial affairs						v √
2010601	Administrative operation						v V
2010602	General administrative affairs						v √
2010603	Organ service						√
2010604	Budget reform business						
2010605	Financial treasury business						
2010606	Financial supervision						√
2010650	Cause operation						
2010699	Other fiscal expenditures						
2040299	Other public security expenditures						
20601	Science and technology management affairs						
2060101	Administrative operation						
2060102	General administrative affairs						
2060103	Organ service						
2060199	Other expenditures on science and technology management affairs						
20603	Applied research						
2060301	Institutional operation						
2060302	Social welfare research						

2060399	Other applied research expenditures				
20604	Technical research and development				
2060401	Institutional operation				
2060402	Application technology research and development				
2060403	Industrial technology research and development				
2060404	Transformation and diffusion of scientific and technological achievements				
2060499	Other technical research and development expenditure				
20605	Technical conditions and services				
2060501	Institutional operation				
2060503	Technical conditions special projects				
2060599	Other technical conditions and service expenditure				
20606	Social science				
2060601	Social science research institutions				
2060602	Social science research		$\checkmark$		
20607	Popularization of science and technology				
2060701	Institutional operation				
2060702	Science popularization activities				
2060703	Youth science and technology activities				
2060704	Academic exchange activities				
2060705	Science and technology museum				
2060799	Other science and technology popularization expenditures				

20608	Science and technology exchange and cooperation			
2060801	International exchange and cooperation			
2060899	Other expenditures on science and technology exchange and cooperation			
20699	Other science and technology expenditures			
2069901	Science and technology awards			
2069999	Other science and technology expenditures			
212	Urban and rural communities expenditure			
21201	Urban and rural communities management affairs			
2120101	Administrative operation			
2120105	Formulation and supervision of engineering construction standards			
2120106	Engineering construction management			
2120107	Municipal public sector market supervision			
2120109	Housing construction and real estate market supervision			
2120110	Professional qualification registration and review			
2120199	Other expenditures on urban and rural communities management			
21206	Construction market management and supervision			
2120601	Construction market management and supervision			
213	Agriculture, forestry and water resources expenditure			
21301	Agriculture			

2130101	Administrative operation			
2130102	General administrative affairs			
2130103	Organ service			
2130104	Cause operation			
2130106	Science and technology transformation and promotion services			
2130108	Pest control			
2130109	Quality safety of agricultural products			$\checkmark$
2130110	Law enforcement supervision			
2130111	Statistical monitoring and information services			
2130112	Agricultural industry management			
2130122	Agricultural means of production and technical subsidies			
2130123	Agricultural production insurance subsidy			
2130124	Institutionalized and industrialized agriculture management			
2130125	Processing and marketing of agricultural products			
2130126	Rural public welfare undertakings			
2130152	Subsidies for college graduates to work at the grassroots			
2130153	Expenditure on grassland vegetation restoration			
2130199	Other agricultural expenditures			
21305	Poverty alleviation			
2130501	Administrative operation			
2130550	Poverty alleviation institutions			
2130599	Other poverty alleviation expenditures			

21306	Comprehensive agricultural development			
2130601	Institutional operation			
2130602	Land management			
2130603	Industrialized management			
2130699	Other agricultural development expenditures			
21399	Other agriculture, forestry and water resources expenditures			
2139999	Other agriculture, forestry and water resources expenditures			
214	Transportation expenditures			
21401	Highway and waterway transportation			
2140101	Administrative operation			
2140102	General administrative affairs			
2140104	New road construction			
2140105	Road reconstruction			
2140106	Road maintenance			
2140108	Road transportation management			
2140112	Road transportation management			
2140113	Road passenger and freight station (field) construction			
2140123	Channel maintenance			
2140127	Ship inspection			
2140131	Maritime management			
2140136	Waterway transportation management expenditure			
2140199	Other highway and waterway transportation expenditure			
21403	Civil air transport			
2140301	Administrative operation			$\checkmark$
2140302	General administrative affairs			
2140304	Airport construction			

21499	Other transportation expenditures				
2149999	Other transportation expenditures				
215	Resource exploration information and other expenditures				
21501	Resource exploration and development expenditures				
2150199	Other resources exploration expenditures				
	Land resources affairs				
2200101	Administrative operation				
2200103	Organ service				
2200107	Social services on land resources				
2200108	Land resources industry business management				
2200113	Investigation of geological and mineral resources				
2200120	Expenditure on special income of mineral resources				
2200150	Cause operation				
2200199	Other land resources expenditures				
22002	Marine management affairs				
2200208	Marine law enforcement supervision				
2200214	Marine use charges				
2200217	Uninhabited island use charge				
2200250	Cause operation		$\checkmark$		
22003	Mapping affairs				
2200301	Administrative operation		$\checkmark$		
2200304	Basic mapping		$\checkmark$		
2200305	Aerial photography		$\checkmark$		
2200350	Cause operation				

2200399	Other surveying and mapping affairs			
22004	Earthquake affairs			
2200404	Earthquake monitoring			
2200405	Earthquake forecasting			
2200450	Earthquake industrial institutions			
2200499	Other earthquake expenditures			
2200599	Other meteorological expenditures			

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