Chapter 13
Government Green Investment

Desheng Lai, Ning Cai and Tingting Rong

Government green investment is a pre-condition and foundation for the whole country's green development. It provides guidance to corporate sector's green production, people's green consumption, and ecological environment protection. During the 11th *Five-Year Plan*, under the guidance of scientific concept of development, all levels of government, aiming to "save energy and reduce pollution", increased green investment to promote the construction of a resource-conserving and environment-friendly society, in order to push the structural adjustment and transform of the national economy.

This chapter focuses on the green investment activities at all levels of Chinese governments, and makes cross-regional comparisons by analyzing government green investment activities during the 11th *Five-Year Plan*. This chapter also looks into the future prospects of government green investment in the 12th Five-Year Plan, and tries to provide valuable reference for the governments in their future green investment activities.

13.1 Overview of Chinese Government Green Investment during the 11th Five-Year Plan Period

During the 11th *Five-Year Plan,* under the guidance of "scientific concept of development" promoted by the central government, all levels of governments in China, both central and local, put more emphasis on green investment and made great achievements. However, there are still some problems with China's government green investment, including: limited channels of investment, imperfect long-term mechanism for investment, etc. These problems need to be solved in future work.

D. Lai (✉) · N. Cai · T. Rong

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13.1.1 Main Achievements of China's Government Green Investment During the 11th Five-Year Plan Period

Chinese government has always paid high attention to green investment. In the theoretical exploration and empirical work during the 11th *Five-Year Plan*, the Chinese government become more determined on the idea of green investment; total amount of funding for green investment increased steadily; green investment projects become more efficient; the legal system in support of green investment become more complete; and many other achievements.

13.1.1.1 Government more Determined About Green Investment

The idea of green investment has been evolving and developing in the Chinese government for a long time. During the 11th *Five-Year Plan*, the government had a more thorough understanding of the concept. Before 2006, the traditional idea of government green investment refers to expenditures on environment protection and investment in pollution treatment. In 2006, against the background of establishing a resource-saving and environment-friendly society, it was proposed for the government to fully use its green investment as guidance for the whole society, to increase investment in green development, and to incorporate various activities to the system of green investment (including expenditures on natural ecological system protection, natural forestry protection, transforming of plant area back to forest, alternative energies research, comprehensive treatment of rural environment, etc.). The objective is for the government to expand its traditional concept of green investment into a broader scope.

In addition, before the 11th *Five-Year Plan*, environment protection expenditure, which is an important part of government green investment, was not included in an independent category of government expenditure, but was put under the entry of "expenditure on environment protection and urban water resources construction". In Feb 2006, considering the actual situation in the functions of Chinese governments and fiscal management, and borrowing the practice from foreign governments in their classification of government functions, the Ministry of Finance published the "*Reform Plan for Classification of Government Revenue and Expenditure*". According to the Plan, since 2007 "environment protection" will be a major category of government expenditure, under which there is administration of environment protection, environment monitoring and supervision, prevention and treatment of pollution, desertization treatment, transform of shepherd land back to grassland, and other entries. Expenditure and revenue in these entries are calculated separately, so that the planning and implementation of government work in environment protection become more regulated and reasonable.

After the 17th Plenary Conference of the CPC, government green investment has become a more and more important part of national green development. It has

become a critical part of implementing the scientific concept of development and the construction of a harmonious society. It is now an integral path to promote faster and more efficient development of the Chinese economy. Up till now, a new structure of China's government green investment has come into being, with the central government in leadership, the central Ministries doing the appraisal and supervision, and the local governments pushing forward the projects. All governments have now a deeper and clearer understanding of the idea of green investment.

Column 13.1 Scientific Promotion of Green Development in Tongyu, Jilin Province

Tongyu District is located on the Horqin Grassland, in the northwest of Jilin Province. There are more than 200,000 ha of cultivated lands, 267,000 ha of grasslands and 173,000 ha of forestlands in the area. Tongyu ranks top in terms of cultivated land area per capita, grassland area per capita and forestland per capita in Jilin. Xianghai in Tongyu is a National Nature Reserve District and an A-class wetland. Moreover, home to 7 of the world's 15 crane species, Tongyu is called the Hometown of Cranes.

Guided by local government and with strong supports from local citizens, green agriculture, green energy industry and green eco-tourism have gradually become the main industries in Tongyu recently. Hence, the green development of Tongyu achieved a remarkable success.

Local government has made much effort to promote green agriculture in Tongyu in the 11th *Five-Year Plan* period. The government developed 100,000 ha of pollution-free agricultural production bases, accounting for nearly half of the cultivated land area in the district. Based on the green agricultural products, the government helped introduce investment from influential green enterprises to enlarge and strengthen local agricultural product markets. Besides, they increased subsidies to agriculture machinery and improved the level of agricultural mechanization. Meanwhile, 75 modern farms were established to reduce the pollution of agricultural production.

As to the green energy industry, with favorable national energy policies and supports from the provincial government, Tongyu was built to become the biggest wind power generation base in China and the biggest wind power equipment manufacturing base in Jilin province. Whilst inviting leading companies in the industry like Huaneng International Power Development Corporation (HIPDC) and China Longyuan Power Group Co. Ltd to invest in Tongyu, the government also helped develop local wind power generation enterprises and promoted the industrilisation of wind power generation. In addition, Tongyu actively developed solar energy and bio-energy, making contribution to the exploitation and utilization of green energy in China.

Moreover, Tongyu put a great amount of manpower, material and financial resources into the green eco-tourism industry, sparing no effort to construct an

Eco-tourism District. It takes full use of the reputation of National Nature Reserve, A-class wetland and the Hometown of Crane to attract tourists, and spends most of the income on ecological environment protection.

In promoting scientific green development, Tongyu has found a green way for both economic growth and environmental protection.

Sources:

1. Ministry of Agriculture of the P.R. China (2010). *The Green Agriculture Development of Tongyu.* Retrieved April 20, 2011, from Ministry of Agriculture of the People's Republic of China website: http://www.moa.gov.cn/fwllm/qgxxlb/jl/201006/t20100625_1588014.htm.
2. The Government of Jilin Province (2010). *Developing Green Economic in County by Science.* Retrieved April 20, 2011, from Tong Yu Sheng Tai Lv You website: http://www.jl.gov.cn/zt/lygj/tystly/zjty/fzcj/201008/t20100820_768564.html.
3. Jilin Daily (2007). *The Green Development of Tongyu.* Retrieved April 20, 2011, from cpc.pople.com.cn website: http://cpc.people.com.cn/GB/64093/64387/6687515.html.

13.1.1.2 Steady Growth of Funding for Government Green Investment

During the 11th *Five-Year Plan*, at the same time of clearer understanding of green investment by China's governments, the size of funding has also been steadily increasing, year after year. Table 13.1 shows the growth of funding for China's government green investment during 2005–2009.

In terms of environmental protection, Chinese government invested a total of RMB99.6bn in 2007, about 2 % of fiscal expenditure. In 2007, the amount increased to RMB145.1bn, about 2.32 % of fiscal expenditure. In 2009, the amount further increased to close to RMB200bn, up RMB48.3bn over 2008, and the share in total government expenditure increased by 0.21 ppt. Within 3 years, total investment in environmental protection almost doubled at an average annual growth rate of 40 %.

In terms of pollution treatment, during the 11th *Five-Year Plan*, government investment had been increasing at an annual average rate of 17.3 %. Although the growth rate was relatively slow in certain years, the overall growth momentum was strong. Total investment amount increased from RMB238.8bn in 2005 to RMB452.5bn in 2009, with a positive growth rate every year. Specifically, in 2008 there was the largest amount of increase at RMB110.3bn, while in 2009 there was the smallest amount of increase at RMB3.5bn. The share in national fiscal expenditure decreased a bit in 2006 and 2009, but was in steady increase in the other 3 years.

Forestry construction and rural environment comprehensive treatment investment account for relatively smaller shares in total government green investment. But still in the 11th *Five-Year Plan*, their growth rates reached 31 and 26.5 %,

Table 13.1 Government green investment during the 11th Five-Year Plan (Units: RMB100mn, %)

	2005	2006	2007	2008	2009
National fiscal expenditure	33,930	40,423	49,781	62,593	76,300
Environment protection investment	–	–	996	1,451	1,934
Share of national fiscal expenditure	–	–	2.00	2.32	2.53
Investment in pollution treatment	2,388	2,566	3,387	4,490	4,525
Share of national fiscal expenditure	7.04	6.35	6.80	7.17	5.93
Investment in forestry construction	459	478	622	837	1,351
Share of national fiscal expenditure	1.35	1.18	1.25	1.34	1.77
Investment in comprehensive treatment of rural environment	144	198	209	282	369
Share of national fiscal expenditure	0.42	0.49	0.42	0.45	0.48

Note Because of changes in statistical caliber, environment protection data after 2006 are not comparable with later data, therefore the data start from 2007 in the above table

Source National Bureau of Statistics, *China Statistical Yearbook* 2007–2010, Beijing, China Statistics Publishing House, 2007–2010; National Bureau of Statistics, Ministry of Environment Protection: *China Statistical Yearbook of Environment* 2007–2010, Beijing, China Statistics Publishing House, 2007–2010

respectively, both above the average growth rate of national fiscal expenditure. Specifically, investment in forestry construction reached RMB135.1bn in 2009, about 2.94 times that of the final year of the 10th *Five-Year Plan*; investment in rural environment comprehensive treatment reached RMB36.9bn, increasing by RMB22.5bn over the final year of the 10th *Five-Year Plan*. Both categories of government green investment saw substantial growth.

In the 11th *Five-Year Plan*, the Chinese government started to pay more and more emphasis on green development. Various categories of government green investment saw high growth rate each year, contributing a lot to the grand cause of green development in China.

13.1.1.3 Substantial Achievement of Government Green Investment

In order to promote green development and to realize fast and high-quality transformation of economic structure, the Chinese government focuses on the target of green economic growth, and takes the coordinated green development of the economy and the environment as a priority task. It has made great achievement in terms of environment pollution treatment, forestry development, rural environment comprehensive treatment, and clean energy development.

In *the* 11th *Five-Year Plan for the National Economic and Social Development of the People's Republic of China*, a target was set to decrease the energy consumption per unit of GDP by 20 %, and to decrease the total amount of pollution by 10 %. Both are constraining targets. By 2010, the first target was pretty much achieved, and the second target was achieved ahead of schedule with two constraining indicators of SO_2 emission and chemical oxygen demand emission down by more than 10 %.

There was also great achievement in forestry construction in China during the 11th *Five-Year Plan*, especially in the several major forestry construction projects. During 2006–2009, the natural forestry protection project, the transforming of plant land back to forests project, the shelter forests construction project in northern China and the Yangtze River area, and the sand sources treatment project for Beijing and Tianjin have finished forestry construction of ha3.88mn, ha4.18mn, ha3.80mn and ha 1.63mn. In particular, the natural forestry protection project and the protection forests construction project in northern China and the Yangtze River area have both achieved more land areas than during the 10th *Five-Year Plan* (ha0.32mn and ha0.64mn, respectively). And the land areas of the other two projects have achieved targets very close to those during the 10th Five-Year Plan. According to the 7th National Forestry Resources Survey (2004–2008), in the past 5 years, the area of forests in China increased by ha 2054.3; forest area per capita increased by ha0.13 ha; and the forest coverage ratio increased by 2.15 ppts.

Rural environment protection is an important part of China's target to build a harmonious society, and is a critical target in the building of "socialistic new rural areas". The Chinese government made great achievements in this area during the 11th *Five-Year Plan*. In 2005, a total of 8,889 mn people benefited from rural water system reform, and the amount was 903 mn in 2009, up a total of 13.6 mn in 4 years. The share of people who benefited from rural water system reform increased from 94.1 % in 2005 to 94.3 % in 2009, up 0.2 ppt. In the first 4 years during the 11th *Five-Year Plan*, there were totally 23.2 mn households in China that started to use clean toilets, increasing by average 4 % annually. The ratio of clean toilets using increased by 7.9 ppts during the period, up 2 % each year on average. The use of pesticide and plastic membrane decreased over the past years, so that arable land pollution was cut at the same time of ensuring sufficient agricultural production.[1]

The government has made grand achievement in green investment during the 11th *Five-Year Plan*, and has paved a solid basis for the next stage of development. In the 12th *Five-Year Plan*, the Chinese government will be able to build on this basis, and realize even greater targets in the cause of green development.

Column 13.2 Dongshan District: The Oasis Near East China Sea

In the south of Fujian Province, Dongshan District locates at the intersection of East China Sea and South China Sea. It lies between Xiamen City and Shantou City, and only a small distance away from Taiwan. Dongshan is an island district and it is poor in natural resources like arable land and freshwater. The ecological environment of Dongshan used to be fragile since the Ming Dynasty. However, a green revolution has made great differences after the new P.R. China was founded.

[1] National Bureau of Statistics, Ministry of Environment Protection: "China Statistical Yearbook of Environment 2010", Beijing, China Statistics Publishing House, 2010.

In order to promote sustainable development and to build an environment-friendly society, Dongshan tried its best to enhance local ecological environment. To protect the limited cultivated lands, measures were taken to prohibit farmers from changing their farmlands to fishing grounds. Local government also planted a large number of trees to construct a windbreak belt, preserving the soils and water. Meanwhile, Dongshan banned sand dredging along the coast to support the development of clean production.

Dongshan saw many actions carried out to implement environment protection supervision during the 11th *Five-Year Plan* period. The government introduced many high technologies to supervise industrial production, reducing the marine pollution. They strictly complied with environment evaluation system and enhanced the management of new projects. Besides, they introduced a third party to monitor the enterprises, collecting the evidences of environment pollution.

Additionally, laws and regulations have been issued to ensure the green development in Dongshan. For example, provincial government and local government published the "*Construction Plan of Dongshan District as National Ecological Demonstration Zone in Fujian Province and the Coast Pollution Rectification Rules of Dongshan District*".

Dongshan became a National Sustainable Development Zone in 2002 and was awarded as one of the National Ecological Demonstration Districts in 2008. With extremely high forest coverage, Dongshan has become the Oasis of East China Sea today.

Source: This column is edited from materials provided by the National Sustainable Development Office of Dongshan District, Fujian Province.

13.1.1.4 Establishment of the Legal System for Government Green Investment

After several years of research and exploration, a comprehensive legal system for government green investment has been gradually established in China. The system is based on "*Constitution of the People's Republic of China*", and includes several special laws, administrative rules and local regulations. Many areas are covered in the legal system, including funding management of green investment projects, financial planning for green investment, financial auditing for green investment, etc.

In May 2007, the National Environment Protection Bureau and the Ministry of Finance published the "*Temporary Rules on the Funding Management of Central Fiscal Expenditure on Special Projects of Major Pollutant Reduction*". The Rules mainly focus on the fiscal funding management by the central government on projects of major pollutant reduction. The goal is to ensure that the targets of major pollutant reduction and related supervision and appraisal system can operate smoothly, so that the major pollutant reduction targets set in the 11th *Five-Year Plan* could be realized. In April 2009, the Ministry of Environment Protection and the Ministry of Finance published the "*Temporary Rules on the Funding Management of Central Fiscal Expenditure on Special Comprehensive Treatment Projects of*

Rural Environment Protection". The Rules provide new strategies to establish socialistic new rural area, to solve the increasingly important rural environment issue, and to improve the environment conditions in rural China. In May 2009, the Ministry of Environment Protection published the "*Notice on Strengthening the Audit of the Central Fiscal Special Funds for Environment Protection*". The Notice is a strong support to the strengthening and regulation of the management in central fiscal special funds for environment protection, to the improvement in efficiency of fund usage, to the improvement in project quality, and to the strengthening of project supervision.

Meanwhile, the central government, various Ministries and local governments also published a wide range of regulations on financial planning of investment projects and the management of "under-cover coffer". For example, there are "*Main Work Points for Financial Planning in the Environment Protection System in China*", "*Notice on the Further Work on the Management of 'Under-cover Coffer'*", "*Notice on the Establishment of Long-term Mechanism for the Management of 'Under-cover Coffer' by the Ministry of*", etc. These regulations actively promoted the strengthening of funding planning of government's fiscal expenditure on green development, the improvement of efficiency in the using of green investment fund, and the perfection of the supervision mechanism on green investment.

13.1.2 Main Problems with China Governments' Green Investment

The Chinese government put great emphasis on green investment in the course of green development, actively designed and perfected investment policies, increased funding for government investment, and made great contribution to China's green development. However, in meantime we must clearly recognize that with the challenging social and economic background nowadays, there are certain problems with green investment, which need to be dealt with during the next Five Year Plan.

13.1.2.1 Limited Funding Sources of Governments' Green Investment Projects

Although the size of funding for governments' green investment has been increasing steadily in recent years, compared with other types of investment, governments' green investment still relies on limited funding sources, and we still need to establish the market system for green investment. Since the targets of green investment (like environment protection, pollution treatment, forestry construction, rural environment comprehensive treatment, etc.) are all public goods, up till now most of the funding for green development is from the central and various local-level governments. There is only a small share of funding for green investment coming from the market system.

However, the development process of the socialistic market economy demonstrates that highly efficient and highly stable investment projects should get their funding from multiple sources and from the market system. The market should decide where the funding shall come from and invest into. Therefore, in the future work of the government, more emphasis should be put on how to fully utilize the function of markets in green investment, to perfect the market system in green investment, to utilize the market's function of resources allocation, to find new funding sources for China's green development, and to inject new energies to the whole cause of green development. In practice, the clarification of property rights by way of market mechanisms like auction and bidding could provide valuable experiences for green investment. And the future direction of green investment is to establish a financial market system of green finance and green bank credit.

13.1.2.2 Unbalanced Allocation of Funding

Since 2006, with the high attention from the central government, the size of funding for China governments' green investment has been growing steadily, and the results of these investments are showing up clearly. But in the specific using of green investment funding, because of various reason, there is the problem of unbalanced allocation. Every year the government will allocate 10 % of fiscal expenditure on green development. Within this 10 %, a large chunk is spent on pollution treatment, which has a substantially larger share than other categories of green investment, or 6 % out of the total 10 %. The share of investment in environment protection is also high at 2 %, and the ratio has been steadily increasing. In contrast, the shares for forestry construction and rural environment comprehensive treatment are relatively small at about 1.5 and 2 %, respectively. Such an allocation structure of funding resulted in the problem that every year pollution treatment and environment protection take up too much funding and the efficiency of fund using is not very high. At the same time, the amounting issue of forestry construction and rural pollution can not get enough funding and thus progress on these aspects have been slow.

13.1.2.3 Legal System for Government Green Investment Needs Improvement

There has been substantial improvement in China's legal system for government green investment, but the legal system today is still not yet good enough to meet the requirements of China's government green investment in practice, and thus is a constrain on China's course of green development. First, the legal system for supervision and appraisal of government green investment needs improvement. Because of the lack of supervision mechanism, there is lack of transparency in some local fund usage, and sometimes green investment fund is discounted in usage or some special project money is used in other areas. Because of the lack of appraisal

mechanism, some of China's green investment funds are put to construction projects purely for the sake of showing-off, and such funds are not used for their more important purpose. Second, some laws and regulations overlap each other. Different laws and regulations are set by different government bodies based on their own interest. In the absence of long-term and coordinative system mechanism, there is an overlap of targets under various laws and regulations, which make the implementation of these laws and regulations unclear. Law-enforcing government bodies can not implement the laws even if the laws are already there, and this substantially lowers the efficiency of the laws and constrained green development in China. Third, the implementation of laws and regulations lag behind, and some of them are not practical. A considerable part of laws related to green investment are no longer suitable for modern green investment development. The strategy to develop the legal system for green investment should adjust the emphasis from ex post punishment to ex ante prevention, and from limitation and constraint to support and guidance, from being vague and overlapping to being clear and transparent. The objective is to absorb the idea of green investment into the legal system and regulation, and to protect the smooth development of green investment in China.

13.2 Regional Comparison of China Governments' Green Investment During the 11th Five-Year Plan Period

During the 11th *Five-Year Plan,* the Chinese economy witnessed fast growth and the overall size of China's economy become the second largest in the world. At the same time, economic development is constrained by both the shortage in resources and the environment pollution. Therefore, all levels of government try to transform the economic development pattern, to promote green development and to support green investment. According to the 2011 green development index system, this chapter tries to compare government green investment from the perspective of provincial-level and major cities comparison, in order to provide strong data and theoretical support of China governments' efforts to further promoted green development and green investment in the next 5 years.

13.2.1 Provincial Comparison of China Governments' Green Investment

In 2009, various levels of government made huge efforts in green development and lent strong support to green investment, in aspects like environment protection, pollution treatment, garden and park construction, rural water system reform, and toilets construction, etc. According to the indicators system, we selected some indicators and make comparisons of local green investment in the eastern, middle,

western and north-eastern regions. We try to differentiate among these four regions in terms of their special characters and differences in green investment.

13.2.1.1 Green Investment in Eastern China

In recent years, the economic growth rate in eastern China regions has always been higher than that in middle, western and north-eastern China. With the fast growth of the economy, there come the issues of high pollution, high energy consumption and other serious environment problems in eastern China. Because of this, provincial governments in eastern China made great effort in pushing green development and strengthening green investment. Details about green investment in 10 eastern provinces and cities in 2009 are listed in Table 13.2.

As shown in the above chart, in the eastern region, Jiangsu and Shandong province had the largest amount of green investment in 2009, or RMB67.88bn and RMB67.66bn, respectively. The amount equaled to 16.9 and 20.71 % of the provinces' annual total fiscal expenditure, respectively. In contrast, Hainan province lagged behind with total investment amount of RMB4.51bn, or only about 6 % of the amount in the afore-mentioned two provinces, and which equaled to 9.27 % of Hainan's annual fiscal expenditure. In terms of the share of green investment in the local governments' fiscal expenditure, Shanghai, Fujian, Guangdong and Hainan all had ratios below 10, or 6.75, 9.01, 8.41 and 9.16 %, respectively, lower than most other eastern provinces. The seven more developed regions in eastern China (Beijing, Tianjin, Shanghai, Jiangsu, Zhejiang, Fujian and Shandong) spent more than 10 % of their fiscal expenditure on green investment. The ratio in Shandong was the highest at 20.71 %.

For investment in specific categories, Jiangsu had the largest amount of investment in environment protection, with a total amount of RMB14.76bn, accounting for 21.28 % of total such investment by the whole eastern China region. As for investment in pollution treatment, Shandong had the largest amount of investment at RMB45.95bn, which was about 67.91 % of total green investment by Shandong province, or 19.97 % of all such investment in eastern China. In terms of garden and park construction, Jiangsu was No. 1 way ahead with total investment of RMB13.94, while Guangdong had the smallest amount of investment at only RMB0.99bn. In the field of rural water system reform and toilets construction, Zhejiang, Guangdong and Jiangsu ranked the top 3 in terms of investment amount, at RMB2.69bn, RMB2.35bn and RMB2.19bn, respectively, which accounted for 20.84, 18.16 and 16.97 % of all such investment in eastern China, respectively.

The eastern region provides important leadership and guidance to the whole nation's economic development, and it has always led the country in terms of transformation of economic development pattern, economic structure adjustment and original innovation. The above characters of green investment in the eastern region are closely related to the economic development level, intensity of resources extraction and government policies implementation in eastern provinces.

Table 13.2 Green investment in Eastern China in 2009 (units: RMB100mn, %)

Province	Green investment projects					
	Environment protection investment	Pollution treatment investment	Garden and park construction investment	Rural water system reform and toilets construction investment	Total amount of government green investment	Share as total fiscal expenditure
Beijing	54.1	208.7	44.4	6.8	314.0	13.54
Tianjin	13.4	103.7	18.1	4.2	139.3	12.39
Hebei	104.2	248.6	72.6	4.2	429.6	18.30
Shanghai	34.0	160.1	7.8	7.6	209.5	7.01
Jiangsu	147.6	369.9	139.4	21.9	678.8	16.90
Zhejiang	55.4	198.0	34.3	26.9	314.6	11.86
Fujian	33.8	87.2	6.9	6.3	134.2	9.51
Shandong	76.2	459.5	125.2	15.8	676.6	20.71
Guangdong	100.8	240.1	9.9	23.5	374.3	8.63
Hainan	18.5	19.7	2.4	4.5	45.1	9.27

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China 2009*", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Statistical Yearbook of Environment 2010*", Beijing, China Statistics Publishing House, 2010

In 2009, the size of economies in Jiangsu and Shandong province ranked No. 2 and No. 3 in China. With strong growth in the economy, there comes more intensive resources extraction, and more environment pollution and industrial pollution. In face of bottle necks in development, Jiangsu province quickens its steps on economic development transformation and implements a series of investment measurements, e.g. the promotion of "green steel", establishment of high-end green and ecological water ways, strengthening the monitoring of waster water collective treatment facilities, treatment of particular environment issues in pollution treatment construction projects, etc. Therefore Jiangsu had relatively larger investment in environment protection and pollution treatment. In the area of construction of socialistic new rural area, Zhejiang, Guangdong and Jiangsu continues to quicken their steps of urbanization, and thus made large investment in rural water system reform and toilets construction. In particular, rural economic development in Zhejiang is a leading example in China. In 2009, Zhejiang provincial government published the "*Implementation Plan in Dinghai District of Rural Toilets Construction as Major Public Hygiene Projects in Zhejiang 2009*", which promoted the hygiene enhancement of rural environment, and focused on water system reform and toilets construction. Besides, Zhejiang also required that newly built houses in rural area must build waster water treatment facilities at the same time, and that old houses must quicken steps in such construction and renovations. Therefore, Zhejiang had quite large investment in these areas.

Table 13.3 Green investment in Middle China regions in 2009 (Units: RMB100mn, %)

Province	Green investment projects					
	Environment protection investment	Pollution treatment investment	Garden and park construction investment	Rural water system reform and toilets construction investment	Total amount of government green investment	Share as total fiscal expenditure
Shanxi	70.6	157.8	14.6	5.1	248.2	15.89
Anhui	59.3	139.2	52.8	12.9	264.2	12.33
Jiangxi	43.1	70.4	29.7	6.8	150.0	9.60
Henan	93.0	121.3	17.4	17.0	248.7	8.56
Hubei	74.2	150.6	21.2	21.6	267.6	12.80
Hunan	73.6	146.4	32.9	13.3	266.2	12.04

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China* 2009", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Statistical Yearbook of Environment* 2010", Beijing, China Statistics Publishing House, 2010

13.2.1.2 Green Investment in Middle China Regions

Middle China regions have always been the important production base for China's agricultural and husbandry products, energies and raw materials. Overall economic power in these regions is strong, but industrialization is generally at low levels. The heavy industries usually account for a large share, and the middle China regions mostly have their comparative advantages in some traditional industries, which have low technology content, low value-added, heavy pollution, and intensive use of resources and energy. Therefore, the middle regions should increase their efforts on government green investment, push on the cause of green development, and try to pursue a new road of industrialization. Detailed information about green investment in the 6 provinces and municipalities in middle China in 2009 is listed in Table 13.3.

As shown in the above chart, among middle China regions, Hubei and Hunan provinces had the largest amount of green investment in 2009, at RMB26.76bn and RMB26.62bn, respectively, which were equal to 12.8 and 12.04 % of each province's total fiscal expenditure that year. In contrast, Jiangxi province was lagged behind, whose total investment was only RMB14.5bn (9.6 % of its total provincial fiscal expenditure), or 56 % of the amount in the afore-mentioned two provinces. Besides, the share of green investment in total fiscal expenditure in Henan province was also low at 8.56 %.

In terms of specific types of investment, Henan province made the largest amount of investment in environment protection at RMB9.3bn, accounting for 17.8 % of total such investment in middle China. In terms of pollution treatment, Shanxi made the largest amount of investment at RMB15.78bn, about 64.78 % of total green investment in Shanxi, equaling to 16.44 % of total such investment in middle China regions. In terms of garden and park construction, Anhui made the

largest amount of investment at RMB5.28bn, while Shanxi made the smallest amount of investment at RMB1.46bn. In terms of rural water system reform and toilets construction, Hebei and Hunan ranked top 2, with investment amounts of RMB2.16bn and RMB1.7bn, respectively, accounting for 24.19 and 19.07 % of total such investment in middle China regions.

There are huge differences of resources endowment among provinces in middle China, and the economic development stages in each province are different. In 2009, the economies of Hubei and Hunan were relatively more developed in middle China, and with economic development, they naturally tend to spend more on green investment. Shanxi is a major producer of coal, and because coal is heavily polluting and intensive in energy usage, Shanxi province has a more serious problem of environment pollution, thus spends more on pollution treatment. Anhui is a leading province in middle China in terms of garden and park construction, and has always been spending a lot on urban park and green land design and construction, as well as on the improvement of the public management system of urban parks and green land. In the field of rural water system reform and toilets construction, Hubei has investment large amounts. By 2009, Hubei has solved the clean drinking water issue for 10.82 million peasants, and 68 % of rural households now have their own toilets.

13.2.1.3 Green Investment in Western China

After more than ten years of "western China development" strategy, there have been substantial economic development and social progress in western China. Large achievements have been made in various fields, which strongly supported balanced regional economic development. In the future, the western region should grasp opportunities, hasten on the course to transform the economic development pattern, and put emphasis on improving the quality of development. The details of green development and green investment in western China in 2009 with its 11 provinces and municipalities are listed in Table 13.4.

As shown in Table 13.4, in western China in 2009, Sichuan province made the largest amount of green investment of RMB31.49bn, about 8.77 % of its annual fiscal expenditure. Hainan province made the smallest amount of green investment at RMB4.37bn, about 14 % the amount in Sichuan. Besides, Ningxia also made a small amount of green investment at RMB5.79bn. In terms of the share of government green investment in fiscal expenditure, Chongqing, Ningxia and Inner Mongolia all had ratios around 14 %, while Sichuan, Guizhou, Yunnan, Gansu and Qinghai all had ratios below 10 %. The ratio in Guizhou was the lowest at 6.28 %.

In terms of specific types of investment, Sichuan made the largest amount of investment in environment protection at RMB11.45bn, about 17.07 % of total such investment in western China. In the field of pollution treatment investment, Inner Mongolia ranked No. 1, with total investment of RMB15.52bn and Qinghai ranked the last with total investment of only RMB1.23bn. As for garden and park construction, Inner Mongolia ranked No. 1 with investment of RMB4.93, while

Table 13.4 Green investment in Western China in 2009 (Units: RMB100mn, %)

Province	Green investment projects					
	Environment protection investment	Pollution treatment investment	Garden and park construction investment	Rural water system reform and toilets construction investment	Total amount of government green investment	Share as total fiscal expenditure
Sichuan	114.5	103.5	27.6	69.3	314.9	8.77
Chongqing	50.1	109.7	42.1	10.9	212.8	16.47
Guizhou	55.3	21.2	0.6	9.1	86.2	6.28
Yunnan	82.2	79.6	7.0	8.6	177.4	9.09
Shaanxi	79.5	119.1	33.7	10.4	242.7	13.18
Gansu	53.2	44.4	2.8	7.2	107.5	8.63
Qinghai	29.0	12.3	1.2	1.2	43.7	8.97
Ningxia	22.6	28.7	4.3	2.4	57.9	13.39
Xinjiang	36.4	78.2	16.1	6.8	137.5	10.21
Guangxi	49.9	132.3	41.0	15.4	238.7	14.72
Inner Mongolia	97.9	155.2	49.3	7.0	309.3	16.05

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China 2009*", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Statistical Yearbook of Environment 2010*", Beijing, China Statistics Publishing House, 2010

Guizhou, Qinghai, Gansu and Ningxia made investments of RMB60mn, RMB120mn, RMB280mn and RMB430mn, respectively. In terms of rural water system reform and toilets construction, Sichuan ranked No. 1 with investment of RMB6.93bn, accounting for 46.76 % of total such investment in western China, while Qinghai and Ningxia only invested RMB120mn and RMB240mn, about 1.67 and 3.39 % the amount invested in Sichuan, respectively.

For a long time, there are huge difference in the stages of economic development, resources endowments and utilization capacities among various provinces in western China. Therefore, these provinces made largely different levels of green investment. In 2009, Sichuan province ranked high within this region in terms of economic development, and it strongly pushed forward infrastructure investment in both urban and rural areas, especially during the period of intensive construction activities after the 2008 earthquake. Therefore, Sichuan made huge amount of green investment in environment protection, rural water system reform and toilets construction, etc. In contrast, Qinghai and Ningxia made relatively small amounts of investment because (1) they have relatively less advanced economies and thus have less pollution and (2) they have not paid enough attention to strengthen comprehensive environment treatment. Specifically, Qinghai needs to pay more attention to major ecological projects like the nature protection zone of "three rivers sources". Wuhai and Erdos of Inner Mongolia have always been the largest

resources-rich regions in northern China, and are the major production bases of coal, electricity, metallurgy, chemical products and construction materials in western China. Because of the old-fashioned strategy of energy-consumption and industrial development patterns, there are serious problems of environment pollution and resources wasting in the area. Therefore, Inner Mongolia made large efforts in aborting redundant production capacities and in comprehensive treatment of industrial wastes, and made large investment in pollution treatment.

Column 13.3 Guilin: Scientific Protection of Lijiang River to Achieve Green Development

Guilin is in the northeast of Guangxi Zhuang Autonomous Region, which is located in the southern end of the corridor between Hunan and Guangxi. It is not only a major tourist city in China, but also a historical and cultural city of China. In Guilin, mountains are beautiful, landscape is exotic. Above all the Lijiang River scenery enjoys the reputation of the most beautiful one in the country.

In 1973, Deng Xiaoping visited Lijiang River and said: "If we destruct the environment of the Lijiang River in order to develop the production, then that is not worth it." Over the years, with the words from Deng Xiaoping as guidance and under the leadership of municipal government, Guilin people explore a scientific way to protect Lijiang River with the basic idea of green development.

During the 11th Five-Year Period, Guilin proposed to focus on urban development strategy, such as creating a modern international tourist city, historical and cultural city and ecological landscape city. Meanwhile, the government put a lot of manpower, material and financial resources to shut down or relocate the dozens of factories and enterprises with heavy pollution and poor environment-friendliness along the Lijiang River. Through the pollution control and environment protection to Lijiang River and its tributaries, water quality has greatly improved and the urban water environment has also been greatly enhanced. Meanwhile, in order to reduce the effect to air quality of the Lijiang River from emissions of gases such as by motor vehicle, Guilin vigorously support new energy development and invest in building the electric car charging stations, using science and technology to protect the Lijiang River. In addition, Guilin has invested heavily in the strict control of infrastructure projects within the scenic area along the river to vigorously cultivate green vegetation, and finally to enhance the level of ecological civilization of Guilin.

To change the impact on Guilin Lijiang River's landscape from the current urban development and industrial sites distribution, so as to minimize the negative effects from the process of urbanization and economic growth on the natural scenery, Guilin build a new model to invest hugely for planning and construction of a new area without the traditional pattern of building and developing along the major river. Thus the whole city and industrial center will be moved westward. "Protect the Lijiang River, push the development of Lingui, recreate a new Guilin", has been identified as the new development strategies and initiatives to protect Lijiang River. To fully implement the resource-saving and environment-

friendly development strategy,Guilin will reduce the old city's population density, free up green space along the Lijiang River, in order to achieve the aim of harmonious development between Guilin urban area and ecological protection of Lijiang River. Today Lingui "new area" is in the full construction to promote environmental protection along Lijiang River to a new level.

On the road of the protection of the Lijiang River, Guilin also actively mobilizes people's power, so that the massive people can get involved and contribute to the protection of the ecological environment. At first Guilin set up a youth volunteer team to protect Mother River, and then held some special campaigns, such as Lijiang River Youth Forum.

Through the efforts of the Guilin government and people, now the Lijiang River's water is still crystal clear, still tree-lined along the two sides. Under the leadership of the municipal government of Lijiang River, local people protect Lijiang River in various scientific projects and means to achieve green development.

Sources: Guilin environmental network; Baidu Encyclopedia: Guilin; Green investment in north-eastern China

13.2.1.4 Green Investment in North-Eastern China

As an old industrial production base, many regions in north-eastern China have been suffering from high energy-consumption and heavy pollution. There are quite a bunch of cities where resources are close to exhaustion. Water and air pollution and ecological issues have become huge hurdles to fast economic development in north-eastern China. In order to promote the transformation of economic development pattern in the region, north-eastern China has been increasing its government green investment to promote green economic development. Details of green investment in the three provinces in north-eastern China in 2009 are listed in the Table 13.5.

As shown in the above table, in north-eastern China, Liaoning made the largest amount of green investment in 2009 at RMB29.8bn, about 11.11 % of total fiscal expenditure that year; Heilongjiang ranked No. 2 with total green investment of RMB18.93bn, or about 10.08 % of its total fiscal expenditure; Jilin made the smallest amount of green investment at RMB13.27bn, about 8.97 % of total fiscal expenditure, or about 45 % of the amount invested in Liaoning.

In terms of specific investment categories, there is not much difference among the three provinces in environment protection investment. Heilongjiang and Liaoning made a bit larger investment at RMB5.91bn and RMB5.57bn, respectively, while Jilin made investment of RMB4.95bn. In the field of pollution treatment, Liaoning made the largest amount of investment at RMB20.49bn, Heilongjiang made investment of RMB10.78bn and Jilin made the smallest amount of investment at RMB6.61bn, which is about 32 or 61 % of the amounts invested in Jilin or Heilongjiang, respectively. In terms of garden and park construction, Liaoning invested RMB2.99bn, ranking No. 1, while Heilongjiang invested RMB1.92bn, and Jilin invested RMB780mn, ranking the last. In the field of rural water system

Table 13.5 Green investment in north-eastern China in 2009 (Units: RMB100mn, %)

Province	Green investment projects					
	Environment protection investment	Pollution treatment investment	Garden and park construction investment	Rural water system reform and toilets construction investment	Total amount of government green investment	Share as total fiscal expenditure
Liaoning	55.7	204.9	29.9	7.5	298.0	11.11
Jilin	49.5	66.1	7.8	9.3	132.7	8.97
Heilongjiang	59.1	107.8	19.2	3.3	189.3	10.08

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China* 2009", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Statistical Yearbook of Environment* 2010", Beijing, China Statistics Publishing House, 2010

reform and toilets construction, Jilin made the largest amount of investment at RMB930mn, Liaoning made investment of RMB750mn and Heilongjiang made investment RMB330mn.

The three provinces in north-eastern China have different levels of economic development. In recent years, the provincial governments set clear targets to push the transformation of those areas where natural resources are getting exhausted, and to push the reform of long-dated industrial bases. Specifically, Liaoning continued to strengthen efforts in the transformation of energy-intensive and heavily polluting industries, in promotion of green development of the whole province, and thus made large amount of green investment. Jilin focused on the protection of ecological forests and economic development pattern reform, and on the protection and construction of "general ecological circle" of the whole north-eastern China region. Heilongjiang is rich in forest and grass land resources and made substantial efforts in protection the "black soil", wet land, forests and grass land, and thus made relatively large investment in garden and park construction. Besides, Heilongjiang, Jilin and Liaoning co-operated with Inner Mongolia in western China regions in terms of ecological projects, and made huge efforts to protect the Changbaishan forestry area and Xing'anling Mountains. The goal is to build the largest-sized forestry land in China.

13.2.1.5 Comparisons of Government Green Investment in Eastern, Middle, Western and North-Eastern China

For a long time, there have been large discrepancies in economic development levels, natural resources endowment, resources extraction etc. among different regions in China. Naturally, there are big different in government green investment for these 4 regions. Table 13.6 lists out those differences in 2009 in detail.

Table 13.6 Comparison of government green investment in eastern, middle, western and north-eastern China in 2009 (Units: RMB100mn, %)

Region	Green investment projects					
	Environment protection investment	Pollution treatment investment	Garden and park construction investment	Rural water system reform and toilets construction investment	Total amount of government green investment	Share as total fiscal expenditure
Eastern	693.6	2300.4	461.0	129.2	3584.2	14.36
Middle	522.3	959.6	168.7	89.2	1739.9	13.95
Western	670.5	884.2	225.7	148.3	1928.6	11.27
North-eastern	164.3	378.8	56.8	20.1	620.0	10.27

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China* 2009", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Statistical Yearbook of Environment* 2010", Beijing, China Statistics Publishing House, 2010

As shown in above table, the ranking of shares of green investment in total fiscal expenditure was eastern, middle, western, and north-eastern, at 14.36, 13.95, 11.27 and 10.27 %, respectively. Since there are abundant natural resources like forestry in the three provinces in north-eastern China, which requires large sum of investment, those provinces have larger investment in garden and park construction. Also because there are only 3 provinces in north-eastern China, green investment in other categories in this region are much smaller than those in eastern, middle and western regions, and are thus not quite comparable. Therefore, in this section, we mainly focus on the comparison between eastern, middle and western regions. In 2009, total amount of green investment in eastern China was far larger than those in middle and western regions, at RMB358.42bn, compared to RMB173.99bn and RMB192.86bn in middle and western China. The amounts in middle and western China were equal to about 48.53 and 53.80 % of that in eastern China.

In terms of specific investment categories, eastern China made the largest amount of green investment in environment protection at RMB69.36bn, accounting for 37.77 % of total such investment in the whole country. Middle China region had the smallest environment protection investment at RMB52.23bn, about 27.69 % of national total. In the field of pollution treatment investment, eastern China also was by far the No. 1 with investment of RMB230.04bn, about 55.51 % of national total, while middle and western regions had similar levels of investment at RMB95.96bn and RMB88.42bn, or 23.16 and 21.34 % of national total. In terms of garden and park construction, the ranking in amount of investment was eastern, western and middle, with amounts of RMB46.1bn, RMB22.57bn and RMB16.87bn, respectively, accounting each for 50.54, 24.73 and 18.50 % of national total. In terms of rural water system reform and toilets

construction, the ranking in amount of investment was western, eastern and middle, with amounts of RMB14.83bn, RMB12.92bn and RMB8.92bn, respectively, accounting each for 40.43, 35.23 and 24.34 % of national total.

The above-mentioned characters of green investment in eastern, middle and western China are closely related not only to the different levels of economic development and intensities of resources utilization in these regions, but also to the important fact that these regions have different regional economic development policies and self-positioning of the region's function in the whole national economy. Eastern China region focuses on cultivating new industrial competitiveness, quickening the development of strategic new industries, enhancing efforts in environment pollution treatment, and dealing with the bottle-necks of resources and environment constraints in the process of development. The middle region provides a connection between the eastern and western regions, and is a key base for agricultural production for the country, a key base for energy and raw materials, a production bases for modern equipment manufacturing and high-tech industries, and also have many critical transportation nexus. The western region sticks to the strategy of "western China development", continues to emphasize infrastructure investment, to strengthen ecological environment protection, to strengthen efforts in the prevention and dealing with natural disasters, and to push forward the construction of key ecological function areas. Because of these different characters of regional economies and development policies, eastern China region makes more investment in government environment protection, especially in pollution treatment. Western region of China makes more investment in garden and park construction, rural water system reform and toilets construction, which is closely related to the natural resources endowment in the region and its policy orientation to focus on infrastructure construction and coordinated urban and rural development.

13.2.2 Government Green Investment in Major Cities

Green development is not only the responsibility of the central and provincial government. All levels of local governments should participate. During the 11th *Five-Year Plan*, many cities in China paid large attention to green development and gave strong support to green investment. They made big achievements in environment protection, waste water treatment, waste gas treatment, garden and park construction, urban environment and hygiene construction, etc. Bases on the geographical pattern of China's government administration, we selected four municipalities directly under the jurisdiction of the central government, four provincial capital cities and five specifically designated cities in the state plan for comparison. We try to analyze the characters and difference in the green investment among these cities.

13.2.2.1 Green Investment of Four Municipalities Directly Under the Jurisdiction of the Central Government

In China, municipalities directly under the jurisdiction of the central government are under direct leadership of the central government, and they are equal to the provincial level in terms of administrative hierarchy. These municipalities directly under the jurisdiction of the central government have the characters of both provinces and independent cities. They have special administrative powers that other normal cities do not have, and they can enjoy special policies and preferential treatment that are absent to other cities. Therefore, in the field of green investment, these municipalities directly under the jurisdiction of the central government have their own special characters, which are worth of our analysis. The details of green investment in the four municipalities directly under the jurisdiction of the central government directly under the center government in 2009 are listed in Table 13.7.

In 2009, among the four municipalities directly under the jurisdiction of the central government, Beijing and Chongqing made the largest amount of green investment of RMB14.3bn and RMB10.2bn, accounting for 6.15 and 7.73 % of each city's annual fiscal expenditure. Shanghai and Tianjin were lagged behind with investment amounts of only about 40 % as those made in Beijing and Chonqqing, or RMB4.6bn and RMB4.3bn, respectively, accounting for 1.54 and 3.84 % of their annual fiscal expenditure. Beijing made the largest amount of investment in urban environment and hygiene construction, with an amount of 42.05 % of total green investment. Tianjin made the largest amount of investment in garden and park construction with 41.86 % of its total green investment amount. Shanghai and Chongqing both made the largest amount of investment in environment protection, whose investment amount equaled to 54.3 and 52 % of their annual total green investment, respectively.

Specifically in terms of individual investment categories, Chongqing made the largest amount of investment in environment protection of RMB5.3bn, accounting for 42.53 % of total such investment in all the four municipalities directly under the jurisdiction of the central government. In the field of waste water treatment projects, Tianjin made the largest amount of investment at RMB407mn, accounting for 50.7 % of total such investment in all the four municipalities. In the field of waste gas treatment, Tianjin also ranked No. 1, with total investment of RMB759mn, or 42.2 % of total such investment in all the four municipalities. As for garden and park construction and urban environment and hygiene construction, Beijing made the largest amount of investment, at RMB4.4bn and RMB6.0bn, accounting for 49.5 and 84.6 % of total such investments in all four major municipalities, respectively.

The different characters of green investment in Beijing, Tianjin, Shanghai and Chongqing are related to the different characters of economic and social development in these cities. During the 11th *Five-Year Plan*, Beijing was planning to host the 2008 Olympic Games and to construct a world-class municipality, and put a lot of efforts in urban garden and park construction and urban environment

Table 13.7 Government green investment in 4 municipalities directly under the jurisdiction of the central government in 2009 (Units: RMB10th, %)

Green investment projects	Environment protection investment	Waste water treatment investment	Waste gas treatment investment	Garden and park investment	Urban environment and hygiene investment	Total amount of government green investment	Share in total fiscal expenditure
Beijing	354,688	1,205	25,718	444,321	599,432	1,425,365	6.15
Tianjin	109,789	40,867	75,921	180,727	24,398	431,702	3.84
Shanghai	250,758	9,703	40,746	77,791	82,800	98	1.54
Chongqing	529,297	28,813	37,522	420,780	1,982	1,018,394	7.73

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China* 2009", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Urban Construction Statistical Yearbook* 2009", Beijing, China Statistics Publishing House, 2010

planning and regulation, so it made relatively large amount of investment in these areas. Shanghai was planning to host the 2010 World Exposition, and focused on protection and improvement of urban environment, and allocated a large amount of human and monetary resources to these tasks. Chongqing is the youngest municipality among the four, with a large land area and a large rural region. It had a relatively lower urbanization ratio, and thus its government green investment has similar characters with those in Sichuan and Hunan provinces. In addition, Chongqing government has been paying special attention to green development and green investment, and strengthened its efforts on environment protection, garden and park construction, waste water and gas treatment, etc. and thus it has invested relatively large amount of money to green investment, with the highest ratio to annual fiscal expenditure among the four municipalities.

Column 13.4 Shanghai Urban Green Land Construction

Shanghai which is one of the four municipalities directly under the jurisdiction of the central government is the largest city in the mainland of China. It has an area of 63.4 km^2 (at the end of 2009), and the total urban population is 17,020,000 people (at the end of 2009). In recent years, Shanghai has been improving the urban ecological construction comprehensively. In 2009, Shanghai urban green land area covers 11.69 million hectares, ranking among the top five all over the country. Urban green area per capita is 87.81 ha/million, ranking top three. Under the guidance of the "One City, Nine Towns" development model, urban development in Shanghai has focused on more "living area", with the urban public "activity centers" and "collective living cycles" in a decentralized pattern, which make up the beautiful ecology landscape in Shanghai. All in all, the Shanghai Municipal Government has made important achievements to promote green investment.

1. Ten years ago: the two "theme parks"

In 2000, Shanghai has completed the construction of "Pudong Century Park" and "Hongqiao Park" in Changning. With these two parks, Shanghai has further enhanced the urban residents' green area per capita and improved residents' quality of life. The Pudong century park covers the total area of 140.3 ha with investment of RMB 10 billion. The main facilities in the park are: weather stations, large lawn, ginkgo avenue, greenhouse, streams, seasonal flower beds, and Montreal garden; Hongqiao park is not only a public open-style theme park to meet the citizen's entertainment and recreational needs, but also a large ornamental garden area,which covers an area of 20,000 m^2 with more than 13,000 m^2 of green area, about 4,000 kinds of trees and a total of 122 species.

2. Five years ago: more "urban green land" to form a healthy life style for Shanghai residents.

In 2006, under the guidance of "One City, Nine Towns" development strategy of the city, Shanghai constructed many urban green land, from the construction of

"Huang Xing green land" in Yangpu District to "Daning green land" in Zhabei District, and from the "Qibao Sports Park" in Minhang District to the "Gucun living eco-park " in Baoshan District. With the construction of these parks, Shanghai has been building the urban environment from the "inner ring" to the "outer ring", so that more people can enjoy the healthy eco-living life style brought by "green city".

3. Nowadays: rebuild the urban landscape

In 2009, the first stage of "Gucun living eco-park" has completed, making up the blanks in urban ecological space in the north of shanghai. "Gucun living eco-park" is located in the northwest of Shanghai, where Gu Town is in Baoshan District, which is at the most vibrant part of the city and also is an important node on the system around the city's ecological planning. The master plan for the "Gucun living eco-park" area covers 434.5 ha, a part of Shanghai's largest urban green space which equals to three "Pudong Century Parks". Among them, the first stage of the park covers an area of 180 ha of theme parks, such as country forest garden, exotic garden, barbecue site, forest walks, and other ornamental garden plants. Currently, the "Gucun living eco-park" has been the most new bright spot around the eco-city construction and development of the whole city of Shanghai. The main planning feature is: "an axis" i.e. Chen Fu Road Park landscape development axis; "an area" i.e. 200 m^2 of ecological function forest along the Outer Ring Road; "three places" i.e. the culture forest area, healthy forest area and forest conservation area.

Sources: Shanghai Municipal Government website; National Bureau of Statistics; The Ministry of Housing and Urban–Rural Construction.

13.2.2.2 Green Investment in Typical Provincial Capital Cities

Provincial capital cities are usually the political and economic centers of each province, and are the focus of economic development policies in each province. Bases on their special positions in each province, provincial capital cities have the best resources and most preferential policies, and thus have the fastest economic development. In the cause of green development, provincial capital cities usually are more aware of the importance of green investment, and always have more funding available. Therefore, provincial capital cities usually do very well in terms of green investment. To analyze the green investment activities of provincial capital cities in China, we select one typical provincial capital city from each of the eastern, middle, western and north-eastern China, and list out the details of their green investment in related fields in 2009, as shown in Table 13.8.

As shown in the above table, within the 4 provincial capital cities of Nanjing, Wuhan, Chengdu and Changchun, Nanjing as a provincial capital cities in eastern China made the largest amount of green investment of RMB4.4bn, or 9.6 % of its annual fiscal expenditure. No. 2 is Chengdu, a provincial capital cities in western China, with total green investment amount of RMB3.35bn, or 5.58 % of its annual

fiscal expenditure. No. 3 is Wuhan, a provincial capital cities in middle China, with total investment of RMB3.35bn, or 6.3 % of its annual fiscal expenditure. Changchun, a provincial capital cities in north-eastern China made the smallest amount of green investment, which is no more than half of those made in the other 3 cities, or 5.29 % of its own annual fiscal expenditure. Nanjing, Wuhan and Chengdu all made large amount of investment in garden and park construction, accounting for 65.77, 39.73 and 65.42 % of each local government's annual total green investment. Changchun made its largest green investment in environment protection, which accounts for 41.22 % of its total green investment.

In individual investment categories, Chengdu made the largest amount of investment in environment protection of RMB882mn, or 34.49 % of total such investment in all 4 cities. In the field of waste water treatment, waste gas treatment and urban environment and hygiene construction, Wuhan ranked No. 1, accounting for 44.76, 46.82 and 50.26 % of total such investments in 4 cities, respectively. In the field of garden and park construction, Nanjing made the largest amount of investment of RMB2.9bn, or 43.59 % of total such investment in all 4 cities.

As the above analysis demonstrates, the pattern of green investment in provincial capital cities is closely related with its geographic location. In the 4 typical provincial cities of Nanjing, Wuhan, Chengdu and Changchun, the city in eastern China has more developed economy and better social development, and thus it makes more reasonable and balanced investments in all categories of green investment. The city in middle China is in the key stage of industrial progress to pull up the overall regional development, and has more serious problems of industrial pollution, and thus makes more investment in industrial pollution treatment. Western city faces serious challenges in urban environment, and thus makes more investment in environmental protection. The city in north-eastern China had started urban construction much earlier, and its urban infrastructure is more out-dated, and thus it makes more investment in urban environment and hygiene construction investment.

13.2.2.3 Green Investment in 5 Specifically Designated Cities in the State Plan by the Central Government

Specifically designated cities in the state plan by the central government in China have equal economic management power as provincial level government, but are lower than provincial government in political hierarchy. They are not capital cities of the provinces, but are considered to be at equal level with capital cities. There are five specifically designated cities in China, namely Dalian, Qingdao, Ningbo, Xiamen and Shenzhen. They, just like capital cities, have abundant resources and receive preferential policies, and have made big achievement in green development. The green investment of these five cities in 2009 are listed in Table 13.9.

Among the five cities, Shenzhen made the largest amount of green investment of RMB17.8bn, or 1.78 % of its annual fiscal expenditure. Dalian, Qingdao and Ningbo made similar amounts of green investment of between RMB1-1.5bn.

Table 13.8 Government green investment in typical provincial capital cities (Units: RMB10th, %)

Green investment projects	Environment protection investment	Waste water treatment investment	Waster gas treatment investment	Garden and park investment	Urban environment and hygiene investment	Total amount of government green investment	Share in total fiscal expenditure
Nanjing	70,751	16,818	24,872	291,105	39,082	442,628	9.60
Wuhan	30,063	24,475	46,496	125,966	90,091	317,091	6.30
Chengdu	88,179	9,185	7,985	219,282	10,546	335,176	5.58
Changchun	66,679	4,202	19,962	31,424	39,516	161,783	5.29

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China* 2009", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Urban Construction Statistical Yearbook* 2009", Beijing, China Statistics Publishing House, 2010

Xiamen government made the smallest amount of green investment at RMB716mn, or 2.67 % of its annual fiscal expenditure. Dalian, Ningbo and Shenzhen mainly focused on environment protection investment, amounting to 55.43, 59.62 and 72.05 % of their total green investment, respectively. Qingdao mainly focused on garden and park construction, with amount equaling to 55.21 % of its total green investment. Xiamen focused on urban environment and hygiene investment, amounting to 58.19 % of its total green investment.

In terms of specific investment categories, Shenzhen ranked No. 1 in environment protection and waste water treatment, with amount of RMB1.28bn and RMB169mn, accounting for 41.11 and 50.01 % of total such investments by all five cities. In the field of waste gas treatment, Ningbo ranked No. 1 with investment of RMB170mn, or 53.23 % of total such investment by all five cities. In the field of garden and park construction, Qingdao made the largest amount of investment at RMB827mn, or 52.63 % of total such investment in all five cities. In the field of urban environment and hygiene construction, Xiamen made the most investment with amounts equaling 49.46 % of total such investments in all five cities.

Among the green investment activities in the five major specifically designated cities in the state plan in mentioned above, Dalian, Qingdao and Xiamen are famous within China and overseas for their beautiful environment, and thus made relatively larger investments in environment protection, garden and park construction, and urban environment and hygiene construction. Ningbo has been putting a lot of efforts in developing its industries, and thus made large investments in industrial waste gas treatment. Shenzhen has relatively higher level of economic growth, and has bigger environmental issues, and thus made relatively larger investments in environment protection.

13.2.2.4 Conclusion

By the comparison of green investment activities in major cities in 2009, we can see that because of different functions, self-images and characteristics of different cities, their green investment also have different characteristics. Municipalities directly under the jurisdiction of the central government have clear advantages in terms of resources and policies because of their special political and economic positions, and so they tend to make the most efforts in green development and made the largest amount of green investment. In comparison, provincial capital cities and specifically designated cities in the state plan have lower and lower amount of resources, preferential policy treatment and funding sources, and thus have less and less amount of green investment. In 2009, the average amount of green investment for municipalities directly under the jurisdiction of the central government, provincial capital cities and specifically designated cities in the state plan were RMB8.34bn, RMB3.14bn and RMB1.24bn, respectively. The differences are obvious. The amount for provincial capital cities is less than half of the amount for

Table 13.9 Green investment of 5 major specifically designated cities in the state plan in China in 2009 (Units: RMB10th, %)

Green investment projects	Environment protection investment	Waste water treatment investment	Waster gas treatment investment	Garden and park investment	Urban environment and hygiene investment	Total amount of government green investment	Share in total fiscal expenditure
Dalian	65,699	3,401	10,913	28,501	10,007	118,521	2.52
Qingdao	38,706	5,975	2,021	82,654	20,349	149,706	3.45
Ningbo	60,231	4,979	17,036	17,998	785	101,029	2.00
Xiamen	18,804	2,554	1,398	7,159	41,641	71,556	2.67
Shenzhen	128,052	16,915	637	20,729	11,405	177,738	1.78

Sources National Bureau of Statistics: "*China Statistical Yearbook* 2010", Beijing, China Statistics Publishing Hose, 2010; Ministry of Environment Protection: "*Annual Statistic Report on Environment in China* 2009", Beijing, China Environment Science Publishing House, 2010; National Bureau of Statistics, Ministry of Environment Protection: "*China Urban Construction Statistical Yearbook* 2009", Beijing, China Statistics Publishing House, 2010

the municipalities directly under the jurisdiction of the central government, and the amount for specifically designated cities in the state plan is only 1/7 of the amount for the municipalities directly under the jurisdiction of the central government.

13.3 Prospects of Government Green Investment in China During the 12th Five-Year Plan Period

During the 12th *Five-Year Plan*, the Chinese government insists on its emphasis about building a resource-conserving & environment-friendly society as the way to quicken the steps on transforming economic development patterns. The government adopts as basic national strategies to implement policies of economic using of resource and environment protection; it continues to strengthen efforts on economic energy consumption and pollution reduction, on developing recycling economy, on dealing with global climate changes, on taking the right path on green investment, on aiming at right targets in green investment, on pushing forward green development work, and on making new progress on government green investment.

The basic strategies and directions of development are clearly stated in the "*The* 12th *Five-Year Plan for the National Economic and Social Development of the People's Republic of China*" (12th *Five-Year Plan*), and are listed in Table 13.10.

As shown in the above table, in the next 5 years, the Chinese government established specific targets for saving resources, environment protection, and pollution treatment, dealing with global climate change, developing the recycling economy, and cultivating strategic newly emerging industries. Hence, with a comprehensive analysis of domestic development prospects, ahead of us is an important strategic period for China's government green investment. The Chinese government should solidly grasp this opportunity, and push forward government green investment, be aware of the challenges, and be ready to deal with difficult situations. On the basis of this, all levels of governments should adopt a series of effective measure, to promote the fruitful development of government green investment in China.

13.3.1 Continue to Perfect the Government Green Investment System in China

Green investment system is the kind of investment system that is built for the objectives of environment protection, promoting the development of recycling economy, and establishment of a harmonious society for man and nature. It includes a wide range of investments for pollution prevention and treatment,

Table 13.10 China government green investment targets for the 12th Five-Year Plan period

Economic using of resources	Maintain mu1.818bn of farm land, reduce water usage of per unit of industrial value-added by 30 %, increase the efficiency ratio of agricultural irrigation to 0.53, promote efficient and economic usage of water in agriculture like pipe water and irrigation under membrane, increase mu 50mn with high-efficiency irrigation, reduce construction land using per unit of GDP by 30 %
Environment protection	Reduce energy usage of per unit of GDP by 16 %, reduce CO_2 emission of per unit of GDP by 17 %, improve forestry coverage ratio to 21.66 %, increase total stock of forestry reserve to 600mn cubic meters
Pollution treatment	Substantial reduce in major pollution emission, 8 % decrease in SO_2 emission and chemical oxygen demand, 10 % decrease in NO chemicals emission, 85 % of urban waste water treatment and 80 % of urban garbage non-polluting treatment
Dealing with climate changes	Control of green house gas emission, utilization of measures like forestry absorption of carbon, promote forestry construction, new forestry land area of ha12.5mn
Development of recycling economy	Promote recycling production methods, increase the comprehensive utilization rate of solid wastes to 72 %, improve resources production rate by 15 %

Source "*The* 12th *Five-Year Plan for the National Economic and Social Development of the People's Republic of China"*, Beijing, People's Publishing House, 2011

ecological environment protection and improvement, etc. It is a necessary route to establish a resource-conserving and society with recycling economy. With the adoption of scientific concept of development, the Chinese government has announced its determination to promote the recycling economy, and the green investment system is becoming more and more important in the overall investment structure in China. In the next 5 years, the Chinese government must continue to perfect the government green investment system, and to ensure the smooth implementation and progress in green investment. First, we must establish a series of formal institutional arrangements including that for environment protection, scientific using of funding, pollution treatment (clean production) and recycling use of materials, etc. We should rely on institutional arrangements to ensure that relevant government bodies will fulfill their duties in green investment. In addition, we must strength the supervision on the using of green investment funds, to avoid improper using of those funds, and to ensure that those funds are spent on where they are most needed. Also, the government should educate the general public to pay attention to environment protection, economic using of resources, recycling use of materials, and green consumptions, etc. These are the informal part of social institutions. With wide-spread propaganda from the government to promote environment protection, green investment shall become a natural habit and social awareness in the general public.

13.3.2 More Government Support on Green Investment with Fiscal and Financial Resources

In the future, the Chinese government shall put up more efforts to design a range of fiscal and financial policies to support government green investment. On the one hand, government shall design fiscal policies to support green investment, e.g. tax preferential, subsidies to green investment projects, etc. to reduce the cost for investors and enhance their profit, and collection of resources tax and environment tax to increase the cost for resources users and environment polluters, so as to encourage investors to make green investment. On the other hand, the government should design a financial system to support green investment, e.g. the state-owned commercial banks shall introduce priority loan treatment to corporations' green investment, and the policy banks should focus on investments that suit the national industrial policies and sectors and industries that fit the need of social and economic development, and the government shall encourage establishment of private financial organizations and to let them fully use their financing capacities, and the government shall also continue to expand and further promote international financing channels, so that we can seek funding from both domestic and international markets, and use the money to support green investment in China.

13.3.3 More Efforts in the Promotion of Government Green Investment in Key Areas

On the condition that the green investment system in China continues to be improved, the government should clarify on the key areas of future green investment, and to ensure that funds for green investment are efficiently used.

First, the government should promote the development of green industries. On the one hand, the government should promote the development of modern ecological agriculture, and continue to quicken the transformation of agricultural development. The government should try to promote the comprehensive production capacity of agriculture, the risk resistance ability of agriculture and the market competitiveness of agriculture. The government should continue to promote scientific and technological innovation of agriculture, to establish a better public distribution system of agricultural technologies, to development modern planting industries, and to promote machinery utilization in agriculture. The government should promote the standardization, specialization, economy of scale, and intensity of agricultural production, so that China could develop a modern agricultural industry system with higher production, better quality, higher efficiency, ecological and safe. On the other hand, the government shall promote the development of modern ecological industries, and try to realize the green transformation of industries in China. The government should insist on the combination of the fundamental role of markets and the guiding role of the government, so the enterprises can continuously optimize and upgrade the traditional industries by themselves, and the government could continuously strengthen its fiscal and financial support. The government should actively cultivate strategic newly emerging industries, based on the specific situations in China and the technological and industrial basis in China. The focus for the current period is to cultivate and promote industries like energy-saving and environment protection, alternative energies, new materials, new energy automobiles, etc., so that a series of leading and pillar industries could be established quickly, and the core competence and economic returns of industries could be established. Besides, the government should promote the development of the tertiary industry to make it more environment and resources-friendly.

Second, the government should make more efforts in the construction of green parks. Green parks are parks that include several related enterprises into one park, under the guiding principle of industrial rotation and co-existence. In the parks, all enterprises cooperate with each other, and the production, logistics and waste treatment facilities are shared, so that land using and investment are most economic. The government should play the roles of policy guidance and encouragement to the enterprises in the construction and investments of the green parks. The government shall also strengthen its efforts to educate the enterprises about the idea. With the green parks, the government is also building a green city at the same time.

Last, the government should enhance investment in green cities. On the basis of green parks, and in order to pursue the goal of a society with recycling economy,

Chinese government is actively implementing green city investments. The green city should follow the 3R rules of recycling economy. The government should develop the recycling and using of renewable energies, so that materials and energies in the cities could circulate within themselves. Many cities play the roles of industry, commerce, service and living at the same time, and recycling style cities are important. In terms of infrastructure, the government should try to build green transportation and green buildings by way of green investment. In terms of urban green land, the government should make scientific planning, and build green land and parks that are suitable to the cities' urban ecological development, so as to build a healthy living environment.

Green industries investment, green parks and green cities investments are along the same line and organically integrated. Government involvement, support and guidance are indispensable for the development of green activities, although the market mechanism is also important. The Chinese government should let the two hands of "government macro-regulation" and "market self-adjustments" play their roles together, to promote the development of green investment, the sustainable development of the society and economic transformation.

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