

Analysis and Suggestion on Distortion of Environmental Protection Investment in China.

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Abstract: The composition and the emphases of environmental protection investment in the 10th Five-Year Plan period have been studied and the result shows that the connotation of environmental investment, the incompatibility between investment direction and investment demand, and the unreasonable investment composition were the most important influencing factors. If the investment in sewage treatment and solid waste disposal facilities is defined as the investment in urban environmental infrastructure, the environmental protection investment will decrease about 50 percent. The deficiency of investment was concealed by the superficial increase of urban environmental infrastructure construction investment and the inappropriate extension the connotation of environmental investment. The distortion of environmental protection investment is very serious. It is suggested that the concept of environmental protection investment should be redefined, the statistical methods of environmental protection investment should be modified, and at the same time, the environmental protection investment should be strengthened and the efficiency should be promoted in order to enhance the efficiency of pollution abatement.

Key words: environmental protection; pollution abatement; investment

The Central Committee of CPC and the State Council have attached great importance to the work of environmental protection in the 10th Five-Year Plan Period, and have earmarked 51.0259 billion yuan of budgetary special fund in the form of state bond for pollution abatement, so as to support the construction of environmental pollution control facilities in the key river basins and regions, and to attract and mobilize the local environmental protection investment and funds from other sources.

1. The total amount of environmental protection investment has increased year by year, but without producing expected effect.

The national environmental protection investment was 47.642 billion yuan and 130.657 billion yuan in the 7th Five-Year Plan period and the 8th Five-Year Plan period respectively. The figure was further up to 351.64 billion yuan in the 9th Five-Year Plan period accounting for more than 1.0% of GDP for the first time in history. The environmental protection investment in 2004 accounted for 1.4% of GDP. The environmental protection investment in the first four years of the 10th Five-Year Plan period totaled 600.71 billion yuan with the share of

1.14%, 1.3%, 1.39%, 1.4% in GDP for the year of 2001, 2002, 2003, and 2004 respectively. Those figures were recalculated to 1.01%, 1.13%, 1.20%, 1.19% based on the adjusted GDP data following the nation-wide economical census (Table 1).

The growth rate of national GDP in 1998 slowed down but the growth rate of environmental protection investment was highest compared to previous years due to treasury bond investment. The total environmental protection investment from 2001 to 2004 was 600.71 billion yuan, reached 1.32% of GDP in the same period. Given the actual environmental protection investment in 2005, the environmental protection investment in the 10th Five-Year Plan period exceeded the planned target of 700 billion yuan. The total size of environmental protection investment increased greatly from 110.66 billion yuan in 2001 to 190.98 billion yuan in 2004 an increase of 72.6%. However the environmental protection investment accounted for a small portion of the total investment in fixed assets, only reaching 2.91% of it. And this ratio between 2001 and 2004 declined as a whole.

The environmental protection is an undertaking which needs a lot of input. Nevertheless, the input for environmental protection in China has been inadequate with a legacy of environmental protection "debt"^[1]. Based on experiences of developed countries, when a country is in the period of rapid economic growth, environmental protection investment should be kept at the level of 1%-1.5% of GDP for a certain period of time in order to control pollution effectively. If this figure reaches 3.0%, then the environmental quality can be improved greatly^[2]. As mentioned above, although the total size of environmental protection investment in China is large, the share of environmental protection investment in GDP is comparatively low. The environmental protection investment needs to be increased further in order to pay off more old debts without creating new environmental problems. The demand for environmental protection investment in China is still huge.

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Table 1 The environmental protection investment in China

Period	Total size of environmental protection investment(100 million RMB)	As % of GDP	As % of the total investment in fixed assets
The 6 th Five-Year period (1981-1985)	170	0.5	
The 7 th Five-Year period (1986-1990)	476.42	0.69	2.41
1991	170.12	0.84	3.09
1992	205.56	0.86	2.62
1993	268.83	0.86	2.16
1994	307.2	0.68	1.88
1995	354.86	0.62	1.77
The 8 th Five-Year period (1991-1995)	1306.57	0.73	2.10
1996	408.21	0.60	1.78
1997	502.49	0.68	2.01
1998	721.8	0.92	2.30
1999	823.2	1.00	2.76
2000	1060.7	1.19	3.22
The 9 th Five-Year period (1996-2000)	3516.4	0.89	2.48
2001	1106.6	1.15	2.97
2002	1363.4	1.30	3.13
2003	1627.3	1.39	2.93
2004	1909.8	1.40	2.73
The 10 th Five-Year period (2001-2004)	6007.1	1.32	2.91

Source: Environmental Financing Strategy

2. The Scope of Environmental Protection Investment has been too broad and needs to be re-examined and analyzed

2.1 The connotation of the concept of environmental protection investment has not been clearly defined

The environmental protection investment is not defined clearly and has been expressed by many ways in China without operational and situation-specific regulations or methodology to define the scope and specification of environmental protection investment^[3].

According to the specification of environmental protection investment statistics in China, the environmental protection investment mainly includes three components^[4]: 1)municipal environmental infrastructure construction investment; 2)industrial pollution sources control investment; 3)environmental protection investment in "three-at-the-same-time" system of construction projects.

2.2 Many investment specifications have been established by environmental protection departments

Many specifications of environmental protection investment have been established by local government

departments resulting in differences in environmental protection investment statistics: 1)whether operating costs of pollution control facilities is included in the specification of environmental protection investment; 2)whether investment in ecological conservation and construction included; 3)whether expenditure on capacity building in environmental management and cost for environmental management service is included; 4) whether investment in projects with environmental benefits is included; 5) whether the investment in clean production and environmental protection friendly product production is included.

Given the fact that strengthening environmental protection has been established by the Central Committee of CPC and the State Council as an important component of materializing the concept of scientific development, many local governments have the tendency of enlarging the range of environmental protection investment inappropriately for the purpose of increasing the absolute value of environmental protection investment. This kind of exercise has caused the superficial high environmental protection investment in many cities but without the corresponding outcomes in curbing environmental pollution and improving environmental quality. This also produces a false optimism in the work of environmental protection and causes some misleading in the judgment of the situation of environmental protection in China.

Environmental protection investment should be

classified as fixed assets investment in which the operating costs of pollution control facilities should not be included. Rather, the operating costs and service costs belong in the category of environmental protection expenditure. Theoretically, investment in capacity building for environmental management should be reasonably classified as environmental protection investment, but the expenses in environmental management service are not. At present, many investment projects with certain environmental benefits, especially the construction of some urban infrastructure such as the centralized gas and heat supply system have been inappropriately included in the environmental protection investment.

In the urban environment comprehensive improvement examination system, environmental protection investment includes: expenditure on pollution control, environmental management and input in science technology and capacity building, but not including the investment in municipal works (such as road, bridges, street lights and flood control), water conservancy and ecological conservation. The optional costs of pollution control facilities have been included in environmental investment which broaden the scope of environmental protection investment to environmental protection input or expenditure.

2.3 The direction of investment demand is inconsistent with statistical scope

The environmental protection investment demand estimated in the Environmental Planning for the 10th Five-Year Plan period was 700 billion yuan which includes pollution control, ecological conservation and environmental capacity building, not including investment in ecological construction. In terms of the composition of the environmental protection investment, the investment in municipal environmental infrastructure construction is 394 billion yuan, industrial pollution source control is 136 billion yuan, and the "three-at-the-same-time" projects is 170 billion yuan^[5].

The total amount of environmental protection investment in China has increased in recent years^[6], which is set about 1.3 to 1.4% of GDP. But there is a big difference between the actual investment (based on statistics) and the predicted demand for environmental protection investment. This means that the investment hasn't been put in the fields where more capital input is needed, resulting in the biased relationship between the expenditure and the effectiveness. It is estimated that the total amount of environmental protection investment in the 10th Five-Year Plan period had reached 800 billion yuan, 100 billion yuan more than the predicted investment demand, mainly due to the over-heated investment in urban environment-related infrastructure construction in which investment in landscaping, gas

supply, central heating is nearly twice as much as the predicted demand, and the investment in industry pollution sources control is lower than the planned and predicted.

According to the analysis of the demand for environmental protection investment in the 10th Five-Year Plan of environmental protection, 120 billion yuan should be spent in urban sewage treatment projects. The statistics show that the investment in municipal drainage works in 2001-2004 has reached 122.7 billion yuan. The investment in projects construction of landscaping, gas supply, and central heating got to 205.24 billion yuan in the first four years of 10th Five-Year period, which exceeded the prediction by 37.7%. If considering the actual investment in 2005, the investment in these three parts was much more than the demand estimation. The investment in industrial pollution sources control in 2001-2004 was 89.28 billion yuan, much less than the demand of 136 billion yuan, even plus the actual investment in 2005. The investment in construction projects in the "three-at-the-same-time" system in 2001-2004 reached 152 billion yuan, which was close to the prediction of 170 billion yuan.

Analyzing on the environmental protection investment, the effective environmental investment is insufficient, and the investment has not well put in place for pollution control projects. so there is a gap between the demand of environmental protection investment and the actual effective investment. Large amount of investment has been placed in where not closely related to environmental pollution control. The environmental capacity building has been relatively under-developed and the operational performance of pollution controlled facilities has not been very well. In this context, the fund for key environmental protection projects in river basins and regions as well as industry pollution control projects is not enough resulting in that some key environmental protection projects of 10th Five-Year Plan were not finished on time and consequently affecting the achievement of targets of environmental quality improvement. Take the key projects in "Three Rivers and Three Lakes" for example, by the end of 2005, only 76%, 55% and 52% of the planned projects in the 10th Five-Year Plan for Huai River, Hai River, and Liao River respectively were completed, and the figure for Tai Lake, Chao Lake, and Dianchi Lake is 87%, 59% and 52% respectively.

As mentioned above, the investment in the new and old pollution sources control has often failed in meeting the target. The degree to which environmental protection investment can be materialized often depends on urban environmental infrastructure construction investment. The investment in urban environmental infrastructure construction has increased unconventionally by a proactive fiscal policy and the universal concern on urban environmental infrastructure construction. This why the

environmental protection investment in the 10th Five-Year Plan period exceeds the prediction. It is worthwhile to mention that the environmental protection investment has the lagged effect.

2.4 The broadened scope of urban environmental infrastructure construction investment has resulted the overestimation of environmental protection investment .

Urban environmental infrastructure construction investment has been accounting for around 60% of overall environmental protection investment in recent years according to the environmental protection investment statistics in which many inappropriate components have been included. Some municipal infrastructure (such as gas supply and central heating)

investment with environmental benefits are regarded as the environmental protection investment. This, on one hand, exaggerates the size of environmental protection investment and, on the other hand, covers up the fact that the actual environmental pollution control investment is insufficient, especially for industrial pollution control. This situation has produced a negative impact on sustainable development of environmental protection.

At present, the data of urban environmental infrastructure construction investment in environmental statistics are based on the data in Urban Construction Statistics Yearbook including the investment in sewage works, central heating, gas supply, sanitation facilities and landscaping. The total amount is 114.4 billion yuan in 2004 accounting for 24% of national urban construction investment(Fig.1).

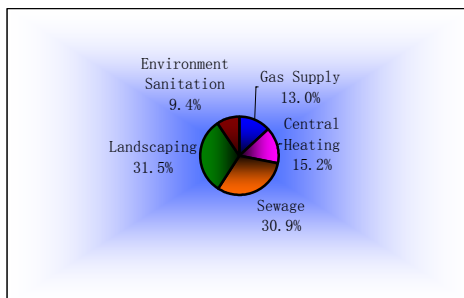


Fig. 1 The composition of urban environmental infrastructure construction in 2004
Source: 2004 China Environment Statistics Yearbook

The criteria for judging environmental protection investment are: 1) the result of the investment (produced products and services) should be in the scope of environmental pollution control and environmental protection; 2) the projects should directly contribute to pollutant emission reduction; and 3) the investment should be wholly for environmental protection. In terms of these criteria, the scope of the above-mentioned urban environmental infrastructure construction investment should be modified: 1) gas supply and central heating should not be included in the scope of environmental protection investment though they have environmental benefits; 2) some components of urban drainage works and city environment sanitation that is not belong to environmental protection investment should be deducted, only including waste water treatment and solid waste disposal components as environmental protection investment; 3) in general, the investment in landscaping

doesn't belong to environmental protection investment. However it needs further discussion on whether landscaping investment should be classified as environmental protection investment.

In summary, if the scope of urban environmental infrastructure construction investment is defined on investment in waste water treatment and solid waste disposal investment then the modified urban environmental infrastructure construction investment in 2004 should be 22.746 billion yuan, only accounting for 20% of the original statistical result of 114.12 billion yuan. The investment in waste water treatment and solid waste disposal that is directly related to environmental pollution control reached 21.16% of urban environmental infrastructure construction investment(Table 2). It is obvious that there is a overestimation on urban environmental infrastructure construction investment.

Table 2 The capital asserts investment of city's construction in 2002 – 2004

Unit:100,000,000RMB

Year	Completed Investment of this Year	Water Supply	Gas Supply	Central Heating	Public Transportation	Road & Bridge	Sewage			Landscaping	Municipal Sanitation		Others
							total	Waste water Treatment	Flood Control		total	Garbage Treatment	
2002	3123.22	170.92	88.42	121.43	293.83	118.210	274.99	144.13	135.09	239.47	64.81	29.72	550.97
2003	4462.43	181.82	133.45	145.82	281.90	204.132	375.15	198.83	124.51	321.94	95.99	35.32	760.42
2004	4762.21	225.12	148.32	173.35	328.49	212.864	352.27	174.50	100.32	359.46	107.79	52.96	838.39

Source: China Urban Construction Statistics Yearbook (2001-2005)

The scope of urban environmental infrastructure construction investment should be reduced and redefined in order to make the investment data and the benefit data more directly co-related. Considering that the urban environmental infrastructure construction investment makes up 60% of national environmental protection investment, the change of the scope of urban environmental infrastructure construction investment will make the national environmental protection investment reduce by around 50%. Thus, and without considering other factors, the environmental protection investment in 2002, 2003, 2004 will be 75.195, 78.947, 99.606 billion yuan respectively, accounting for 0.71%, 0.67%, 0.73% of GDP, and 0.62%, 0.58%, 0.62% in the adjusted GDP after the National Economical Census. In the 10th Five-Year period, the direct pollution control investment only reached about 0.6% of GDP.

3. The composition of environmental protection investment is not quite reasonable.

3.1 The overall composition of environmental protection investment

The total amount of environmental protection investment and its share in GDP have increased year by year from 1998 to 2004 (Table 3). Analyzing on the absolute value of environmental protection investment, the urban environmental infrastructure construction investment has increased the most and has been the largest part of environmental protection investment with the average share of 59.8% between 2001 and 2004.

Table 3 The composition of environmental protection investment in China

	1998	1999	2000	2001	2002	2003	2004
Total amount of environmental protection investment	721.8	823.2	1060.7	1106.6	1363.4	1627.3	1909.8
Urban environmental infrastructure construction investment(100 million RMB)	456	478.9	561.3	595.7	785.3	1072	1141.2
Industry pollution sources control investment(100 million RMB)	122	152.7	239.4	174.5	188.4	221.8	308.1
Investment in construction projects in the "three-at-the-same-time" system(100 million RMB)	142	191.6	260	336.4	389.7	333.5	460.5
Proportion of urban environmental infrastructure construction investment(%)	63.18	58.18	52.92	53.83	57.60	65.88	59.75
Proportion of industry pollution sources control investment(%)	16.90	18.55	22.57	15.77	13.82	13.63	16.13
Proportion of investment on construction projects of the "three-at-the-same-time" system(%)	19.67	23.28	24.51	30.40	28.58	20.49	24.11
Urban environmental infrastructure construction investment in fixed assets investment(%)	1.61	1.60	1.71	1.60	1.81	1.93	1.63
Industry pollution sources control investment in fixed assets investment(%)	0.43	0.51	0.73	0.47	0.43	0.40	0.44
Investment in construction projects in the "three-at-the-same-time" system in fixed assets investment(%)	0.50	0.64	0.79	0.90	0.90	0.60	0.66
National GDP(100 million RMB)	78345.2	82067.5	89468.1	97314.8	105172.3	117390.2	136875.9
Environmental protection investment in GDP(%)	0.92	1.00	1.19	1.14	1.30	1.39	1.40
GDP modified(100 million RMB)	8440289677	770099215	1009655	109655	120333	135823	159878
Environmental protection investment in GDP modified(%)	0.86	0.92	1.07	1.01	1.13	1.20	1.19

Source: China Environment Statistics Yearbook (1999-2005) and China Statistics Yearbook (1999-2005)

The elastic coefficient of environmental protection investment in China has been above 1.0 since 1997(except for 2004 when it was 0.44) indicating that the growth rate of environmental protection investment exceeded the growth rate of GDP. However the analysis on the continuing data of elastic coefficient of environmental protection investment has shown a trend of rising first and falling later. In particular, the elastic coefficient of environmental protection investment has been staggering around 1.0 in the last couple of years, indicating an equal growth rate with economic development. The situation that the growth rate of environmental protection investment is faster than that of economic growth could not continue. It is quite difficult to ensure that the growth rate of environmental protection investment is higher than the growth rate of economy, especially when taking the financial policy change into account. In view of the growth of environmental protection investment from 1994 to 2004, the growth rate of urban infrastructure investment is the highest. The growth of urban environmental infrastructure construction drove the increase of the environmental protection investment as whole. In contrast the growth rate of industrial pollution source control investment is the lowest with obvious fluctuation and even decline in some years. The elastic coefficient of the investment in industry pollution source and new projects in the "three-at-the-same-time" system are lower than that of urban infrastructure construction. The reasons for the decline of industry pollution control investment may include the lack of strict monitoring and supervision and

enterprises' enthusiasm, and imperfect investment channel which adds the difficulty in financing enterprises' pollution control efforts. In the original financing channels for environmental protection investment, the channels of the investment in the "three-at-the-same-time" system and urban infrastructure maintenance and construction are comparatively smooth, but there are problems in other channels. The policy that 7% of the enterprise's renovation fund could be used for environmental technology renovation has not been applicable after the reform of national financial and taxation system. Because the pollution treatment facilities can not bring about the direct economic benefits, the availability of bank loan and foreign investment for environmental protection is limited. The pollution fee paid by enterprises will not be returned after the reform of pollution charge system, most of which is used to the regional pollution control. The total amount of the investment in pollution abatement has increased and the support for it has been strengthened.

3.2 The amount of urban environmental infrastructure construction investment is too large.

The absolute amount of urban environmental infrastructure construction investment has increased obviously and its share in environmental protection investment has also increased(Table 4). The amount of urban environmental infrastructure construction investment has increased year by year from 1981 to 2004^[7].

Table 4 The investment and proportion of urban environmental infrastructure construction in China

Year	Urban environmental infrastructure construction investment(100 million RMB)	urban environmental infrastructure construction investment in environmental protection investment(%)
The 6 th Five-Year Plan period (1981-1985)	51.00	30.68
The 7 th Five-Year Plan period (1986-1990)	153.72	32.06
The 8 th Five-Year Plan period (1991-1995)	477.50	36.54
The 9 th Five-Year Plan period (1996-2000)	1744.37	52.30
The 10 th Five-Year Plan period (2001-2004)	3594.2	59.83

Source: Environmental Financing Strategy

The ratio of urban environmental infrastructure construction investment in the total amount of environmental protection investment has kept high, which increased from 30.68% in the 6th Five-Year Plan

period(1981-1985) to 59.83% in the 10th Five-Year Plan period (2001-2004), rising by about 30%. Most investment in the urban environmental infrastructure construction doesn't have a close relationship with the

environmental pollution abatement. In the 10th Five-Year Plan period (2001-2004), the investment on gas supply projects, central heating and landscaping have reached 57% of the total environmental infrastructure construction investment, 34.2% of the total environmental protection investment. In addition, only a half the investment that is used in drainage works and municipal sanitation has been used in waste water treatment and solid waste disposal, which causes that the environmental benefits of pollution treatment is not obvious.

3.3 The investment in industrial pollution sources control is inadequate and fluctuates

In the 10th Five-Year Plan period(2001-2004), the investment in industrial pollution sources control is 89.28 billion yuan, reaching 14.9% of the total amount of environmental protection investment and 2.74% of the enterprise's renovation fund which is part of social investment in fixed assets. The total amount of investment in industrial pollution sources control has increased year by year in recent years - 12.2 billion yuan in 1998, and 30.81 billion yuan in 2004. But its growth rate has fluctuated too much, and its share in the environmental protection investment is still low. The growth rate of industrial pollution source control investment exceeded the growth rate of GDP of the same period of time, the first time, in 1996. However, the elastic coefficient of industrial pollution source control investment showed negative in 1997 and 2001.

The proportion of industrial pollution sources control investment in the total investment is on the small side and shows a tendency of declining. In the 7th Five-Year Plan period, the investment in old industrial pollution sources control accounted for 41.18% of the total environmental protection investment making up the largest share in environmental protection investment. But this ratio decreased obviously in 2004. The investment in industrial pollution sources control accounted for 16.9% of environmental protection investment in 1998, and 16.13% in 2004. The fluctuation of the ratio was quite obvious in the period of 1998 to 2004. It rose from 1998 to 2000, but it dropped from 2000 to 2004. In addition, the ratio between investment in enterprise's old industrial pollution sources control and investment in enterprise's fixed assets (technical renovation) has decreased noticeably. The channel of the enterprise's renovation investment has not been operated well, resulting in a prevalent phenomenon that the old industrial pollution sources discharge pollutants that exceed the stipulated standards.

The investment in old industrial pollution sources control reached 23.94 billion yuan due to the implementation of some measures including so called "meeting two standards with one way" in 2000. But the

investment in 2001, 2002, 2003 were less than that in 2000. This indicates that the share of industrial pollution sources control investment has not increased with the increase of the industrial pollution sources and the accumulated investment in fixed assets. This also suggests that the adequate attention has not been paid to the renovation of industrial pollution sources control facilities and the intensive control of old pollution sources. As a matter of fact, those old pollution sources with low technological level have comparatively large amount of pollutants discharge and are difficult in meeting the discharge standard steadily.

3.4 The investment in construction projects complying with the "three-at-the-same-time" system can not guarantee that there will be no new "debts" of environmental investment .

The environmental investment in construction projects in compliance with the "three-at-the-same-time" system makes up a small part in the total investment in fixed assets and the construction of the required pollution control facilities is often behind the schedule. In the 10th Five-Year Plan period (2001-2004), the environmental investment in construction projects in compliance with the "three-at-the-same-time" system was 152.01 billion yuan accounting for 25.3% of the environmental protection investment, about 4% of the actual investment in construction projects which implemented the "three-at-the-same-time" system, and 0.74% of the total investment in fixed assets. The environmental investment in construction projects in compliance with the "three-at-the-same-time" system has increased year by year in recent years with a remarkable growth rate and a stable share in environmental investment.

The environmental protection investment in construction projects in compliance with the "three-at-the-same-time" system in 2000 was 26 billion yuan reaching 5.7% of the total investment. In this year, the implementation rate of the "three-at-the-same-time" system and the proportion of environmental protection investment were relatively high due to the strengthening of pollution sources control and practicing "meeting two standards with one way" in 2000, which reflected that the status of investment in industrial pollution sources control directly depends on the intensity of supervision on pollution sources control in each year. In 2000, though the statistics showed that implementation rate of the three-at-the-same-time" system had reached 100% in electricity industry, but desulphurization facilities in power plants were not all in place at reflecting that there is some loopholes in implementing the "three-at-the-same-time" system.

The environmental protection investment in construction projects in compliance with the "three-at-the-same-time" system was 14.2 billion yuan in

1998 and 46.05 billion yuan in 2004, 3.2 times as much as that in 1998. The environmental protection investment in construction projects in compliance with the "three-at-the-same-time" system is one of the stable sources of environmental protection investment in China. The fact that the environmental protection investment in construction projects complying with the "three-at-the-same-time" system has been larger than the investment in old industrial pollution sources control reflects that the new projects always pay more attention to the investment in environmental pollution control than old enterprises.

4 Conclusions and Suggestions

4.1 Conclusions

1) The total amount of environmental protection investment has increased year by year in recent years with the increasing share in GDP but still inadequate to meet the actual demand. China has a legacy of environmental protection 'debt', so environmental protection investment should be increased further.

2) Most of environmental protection investment has not been used in environmental pollution control, so there is a sharp contrast between the continued increase of environmental protection investment and the continued environmental degradation. The fact that, on one hand, there is a large amount of environmental protection investment which exceeds the planned estimation, and, on the other hand, the environmental protection targets are not achieved and a lot of pollution control arte not in place as planned is easily to mislead the judgment of the situation of environmental protection in China.

3) The elastic coefficient of environmental protection investment in China has kept declining, and the difficulty in increasing the environmental protection investment is getting greater. In the coming years while paying off the "environmental debts" in history, the increasing of pollution load caused by the rapid economic growth also request large amount of investment. So it is difficult to keep the environmental protection investment increasing following the decline of urban environmental infrastructure construction investment.

4) The composition of environmental protection investment is not quite reasonable, and the share of urban environmental infrastructure construction investment is on the higher side. The investment in industry pollution sources control and construction projects in compliance with the "three-at-the-same-time" system still needs to be further increased.

5) The total amount of environmental protection investment which is actually used in pollution control is

comparatively small. The investment in sewage works and solid waste disposal that is directly related to pollution control only makes up 21.16% of urban environmental infrastructure construction investment. Therefore, the overestimation of urban environmental infrastructure construction investment has resulted in the sharp contrast between the large amount of environmental protection investment and the unsatisfied urban environmental situation. So the targets of environmental protection is hard to be accomplished.

4.2 Suggestions

1) The scope of municipal environmental infrastructure construction investment should be narrowed. Urban environmental infrastructure construction investment in the environmental protection investment needs to be redefined, the statistic specification of environmental protection investment also needs to be modified, so as to compare environmental protection investment with the control effects. It is suggested that the investment in gas supply, central heating and landscaping which are not closely related to the effects of environment control should be not included in urban environmental infrastructure construction investment. Only the investment in waste water treatment and solid waste disposal facilities in urban drainage works and municipal sanitation facilities investment should be included.

2) Some issues regarding the scope of environmental protection investment which have caused confusion should be studied and clarified. For instance, it should be well clarified that whether the operating costs should be regarded as environmental protection investment; whether the investment in ecological conservation, capacity building, rural environmental protection and clean production should be included in environmental protection investment. The statistical scope and specification of environmental protection investment should be standardized. At the same time, the statistical specification should be broadened by adding the components of the sources of funds, operating costs and benefits. Place emphasis on monitoring the share of investment for compliance with the "three-at-the-same-time" system in the investment in fixed assets of new projects, and the share of investment in pollution control of old enterprises in enterprise's investment in fixed assets for renovation in order to strengthen the control of pollution sources.

3) The environmental protection input needs to be increased further in order to pay off more old debts without creating new environmental problems. The old environmental debts in China has not been paid off yet, and some new debts are still occurring. So what is needed is to diversify investors, make financing market-oriented, and diversify the ways of investment in order to raise the fund as much as possible and keep the total amount of

environmental protection investment increasing. Control the situation that the total amount of pollutants emission increases with the increase of economy through strengthening pollution reduction efforts in order to pay off more old debts without creating new environmental problems.

4) The environmental protection departments are lack of strict monitoring and supervision on the operation of pollution control facilities after their installation at the old pollution sources. The enterprises don't have the pressure to carry out renovation. In this context the degree of meeting discharge standards of the old pollution control facilities is relatively low, having negative impact on environmental security. Therefore comprehensive measures should be taken to deal with

this issue.

5) The operating costs should be paid more attention to. The total amount of pollution control facilities is getting more and more. So the operating costs of pollution control facilities, including municipal environmental infrastructure will continue to increase in coming years, the total amount of which may overpass the investment of new projects.

6) To establish a statistical system of environmental protection investment which is compatible with system. The cooperation with OECD countries should be strengthened. The environmental protection investment account, environmental pollution control account and environmental protection expenditure account should be established in order to compare with other countries.

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