

ENVIRONMENTAL FINANCING IN CHINA: A REVIEW

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1. Introduction

1. The financing of environmental protection is a key factor in solving pollution problems. The government of China has recognised the importance of improving environmental quality in concert with the economic modernisation process. In this context, funding of environmental protection has increased annually since the early 1980s and national investment in pollution control amounted to 82.32 billion yuan¹ (just over US\$10 billion) in 1999.

2. Environmental investments made under the planned economic system have provided a basis for new approaches as China shifts towards a market-based economy and as new types of financing instruments are piloted. A review of China's environmental financing policy, total investments, financing mechanisms and institutions is timely given the impending implementation of the 10th 5-year plan period (2001-2005). These issues are considered in the paper. We begin in section 2 by reviewing the status of environmental investments and financing in China while section 3 considers the existing mechanisms for environmental financing. Section 4 discusses anticipated needs for environmental financing in the next five years and section 5 presents conclusions.

2. Status of Environmental Investments and Financing in China

3. Environmental investments are difficult to calculate in detail because they include funds contributed by enterprises themselves and intangible items for which there are no statistical data. Here we analyse aggregate trends in environmental investment.

2.1 Definitions

4. To begin, we define several concepts used in the paper. First, the term environmental expenses refers to items such as depreciation of fixed assets used for environmental protection purposes, raw materials expenditure, fuel and power costs, employee salaries and payments for pollutant discharge. Second, environmental investment refers to funds used for the purpose of preventing or controlling pollution or protecting the natural environment. Third, environmental financing is the general term that includes both environmental expenses and investment. Environmental investment and environmental

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¹ US\$1 = 8.2770 yuan <<<http://www.bloomberg.com/markets/wcv1.html>>> accessed 2 November 2000.

financing are interrelated but different concepts. The main purpose of the latter is investment but some environmental investments do not need financing.

2.2 Three Phases in Environmental Investment and Financing

5. The development of China's environmental investment and financing policy is linked to reform of the country's economic system and changing ideas about environmental management. Three phases can be distinguished, beginning in the 1970s.

6. The first phase started with the First National Conference on Environmental Protection in 1973 and ended at the beginning of the 1980s. During this period China adhered to a planned economy and investment in pollution control was funded principally from the national budget under the leadership of the State Council's Lead Group on Environmental Protection and implemented by various industry departments, provinces and municipalities. The statistics for this period are incomplete but it is estimated that from 1973 to 1981, 504 million yuan was allocated from the national budget (Zhang Kunmin, 1992).

7. In the second phase, from the beginning of the 1980s to the mid-1990s economic reforms began to deepen and accelerate. Environmental investments underwent a major change in scope, shifting from single to multiple projects and from a single investor to multiple investors. In addition, a number of regulatory instruments were adopted during this period. In 1982, the State Council promulgated legislation on the pollution levy system requiring 80% of revenue collected under the system to be used for pollution control. This was followed in 1983 by the Regulations for the Prevention of Industrial Pollution and Plant Modernisation. In its Decision on Environmental Protection Works, issued by the State Council in 1984, eight channels for financing environmental investments were identified². In June, 1984, six state agencies, the Ministry for Urban and Rural Construction and Environmental Protection, the State Planning Commission, the State Commission for Restructuring the Economic System, the Ministry of Finance, the People's Bank of China and the China Industrial and Commercial Bank, jointly issued the Regulations Concerning the Financing of Environmental Protection. The State Council issued the Draft Regulations Concerning the Special Fund for Pollution Control in 1988 and in the same year the then-named National Environmental Protection Agency (NEPA)³ selected Shenyang as a pilot city for the establishment of an investment corporation. Further pilot projects were subsequently set up in other provinces and municipalities, e.g. Tianjin. The increase in channels for environmental investment and improved regulatory oversight during this period contributed to a growth in environmental financing.

8. The third phase began in the mid-1990s. In July 1995, the Ministry of Finance issued a notice requiring the finance departments at different levels of government to actively co-ordinate with their counterparts in environmental and other departments in carrying out environmental projects. In November of the same year the NEPA issued a notice aimed at broadening the channels of environmental financing, increasing funding for environmental protection and improving the efficiency of expenditure from local environmental funds. A State Council decision in 1996 called for improvements in the integration of environmental and economic policies by increasing environmental investments and strengthening measures

² The eight investment channels refers to environmental investments required under the "three simultaneous steps" regulation for new projects, investments associated with the upgrading and redevelopment of existing plants, investments in urban capital construction, grants provided under the pollution control fund, investments sourced from profit under the "three kinds of waste" policy, loans from banks and financial institutions, investments under the special fund for pollution control and investments funded by external sources such as international financial institutions and bilateral co-operation programmes.

³ Since renamed the State Environmental Protection Administration (SEPA).

for environmental protection. During the third phase all provinces, autonomous regions and municipalities have been required to adhere to the “three simultaneous steps” regulation concerning the installation of pollution control measures in the design, construction and operation of new construction projects and to gradually increase investments in environmental projects from their budget. Government finance departments and banks have also been actively involved in environmental investments, and new financing mechanisms such as foreign loans, build-operate-transfer (BOT) agreements and security markets have been used.

2.3 *Scope of Environmental Investments and Investment Sources*

9. The current scope for investments in pollution control is three-fold:

- in new projects subject to the “three simultaneous steps” regulation;
- in renovating and redeveloping existing enterprises, including the introduction of cleaner production technologies and practices;
- in the construction of urban environmental infrastructure. This includes the building of a sewage collection network, construction of sewage treatment plants, establishment of an urban district heating network and waste management projects.

10. There are currently three major sources of investment funding in China. First, from central and local government budget allocations. Second, financial institutions and the private sector. This is principally in the form of loans. Third, enterprises themselves. This includes financing in whole or in part the costs of modernising and renovating existing facilities as well as their payments under the relevant regulations such as the “three simultaneous steps” or the pollution levy system.

11. Funds from these sources are directed into eight channels. They were defined by the State Council in 1984 and have played an important role in strengthening environmental protection. However, with reform of the economic system, there have been some new developments that affect these financing channels.

2.4 *Overview of Environmental Investments, 1986-1999*

12. Table 1 shows the proportion of total investment in pollution control to GNP for China during the period 1986-1999. Several points stand out from an examination of the table.

13. First, the annual total investment in pollution control during this period trended up. Investment during the 8th five-year plan period (1991-1995) was 2.7 times that in the preceding five-year period, while investment in the first 4 years of the 9th five-year plan period (i.e. 1996-1999) exceeded total investment in the 8th five-year plan period. This trend reflects a growing recognition by the government and the public of the importance of addressing pollution.

14. Second, although annual total investment increased consistently the share of environmental investment to GNP did not parallel this trend. In the 7th five-year plan period the share was 0.6% and averaged 0.77% in the 8th five-year plan period. There was considerable fluctuation during the first 4 years of the 9th five-year plan period, ranging from 0.6% in 1996 to 1% in 1999.

15. Third, the share of investment in pollution control to total national investment in fixed assets also fluctuated. The share was comparatively higher at the end of the 7th five-year plan period and the beginning of the eighth five-year period (2.41% and 3.09% respectively), but fell at the end of the 8th five-year plan

period to 1.77%. In the first 4 years of the 9th five-year plan period the share has climbed again, reaching 2.76% in 1999.

16. These observations suggest that, on the one hand environmental investments are closely related to national economic development and, on the other hand that environmental investments have actually increased over time.

17. Figure 1 shows the changes that have occurred over time for each of the three main groups receiving environmental investments: urban infrastructure construction, renovations/redevelopment of existing enterprises and new projects.

18. Figure 1 indicates that the structure of environmental investment has changed over time. Although investments in new projects increased annually, its share in the overall total for investments has fluctuated. In the 7th five-year plan period the share was 26.57%, increasing in the 8th five-year plan period to 27.91%. It dropped to about 26% in both 1996 and 1997 (the first two years of the 9th five-year plan period), and fell further in 1998 to 19.7%. In 1999 it rose to 23.3%. Overall, the share of investment in new projects has declined.

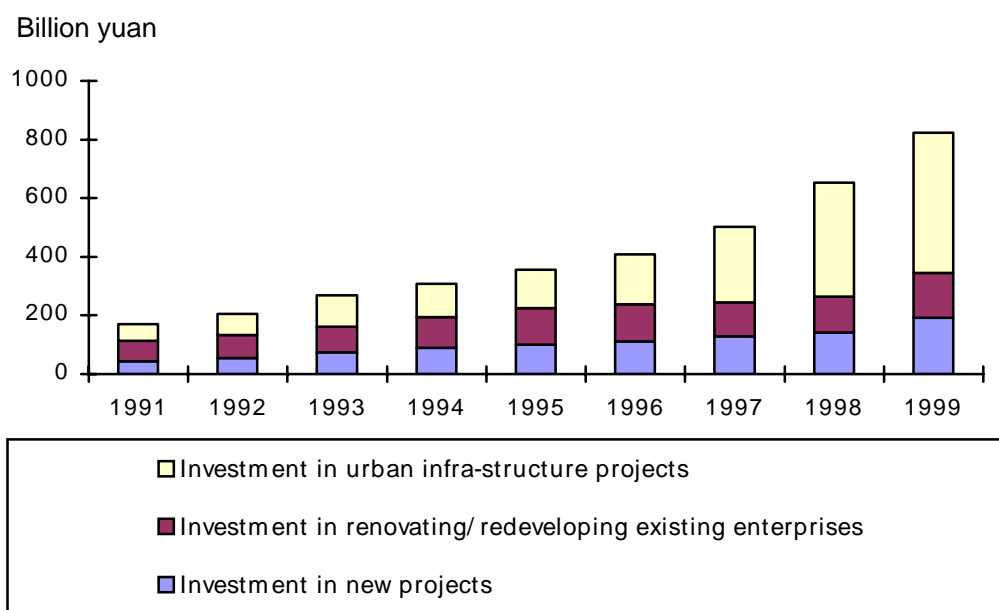
19. Investment in pollution control in existing enterprises has remained fairly constant but as a proportion of total investments it has declined. In the 7th five-year plan period, the share of total investment in pollution control to total investment in existing enterprises was 41.18%, falling to 35.54% in the 8th five-year plan period, then 23.15% in 1997. In 1998 and 1999, the figures were 16.9% and 18.5% respectively.

Table 1: Share of Total Investment in Pollution Control (TIPC) to GNP and Total National Investment in Fixed Assets, 1986-1999

Year(s)	TIPC (billion yuan)	Share of TIPC to GNP (%)	Share of TIPC to total national investment in fixed assets (%)
Summary for 7 th five-year plan period (1986-1990)	47.64 (total figure)	0.60	2.41
8 th five-year plan period (1991-1995)			
1991	17.01	0.84	3.09
1992	20.56	0.86	2.62
1993	26.88	0.86	2.16
1994	30.72	0.68	1.88
1995	35.49	0.62	1.77
Summary for 8 th five-year plan period (1991-1995)	130.66 (total figure)	0.77 (averaged figure)	2.30 (averaged figure)
First 4 years of 9 th five-year plan period (1996-1999)			
1996	40.82	0.60	1.78
1997	50.25	0.68	2.01
1998	65.29	0.84	2.30
1999	82.32	1.0	2.76

Source: Editorial Committee of China Environmental Yearbook, 1996-1999.

Figure 1: Changes in Pollution Control Investments, 1991-1999



20. Both environmental investments in urban infrastructure projects and its proportion to total investment have increased. The former was 15.36 billion yuan in the 7th five-year plan period, rising to 47.75 billion yuan in the 8th five-year plan period and to 129.58 billion yuan in the first 4 years of the 9th five-year plan period. The latter figure was 2.7 times higher than the total environmental investment during the 8th five-year plan period. As a proportion of total investment in urban infrastructure projects, the figure was 32.25% in the 7th five-year plan period, 36.55% in the 8th five-year plan period and increased substantially to reach 51.20% in the first years of the 9th five-year plan period. The upward trend was maintained in 1998 and 1999, attaining about 60% in each year.

21. Two reasons underlie the variation in environmental investment. First, it varies with changes in China's policies for environmental investment. Second, it is closely linked to the relative prioritisation of different sources of investment and the current focus of environmental protection programmes.

22. Water pollution control and the construction of urban water supply and drainage projects have long been important areas for environmental investment in China. Overall, investment in water pollution control can be divided into two categories: (i) investment in industrial water pollution control, including in both new projects and improvements to existing enterprises; and (ii) investment in urban wastewater management projects (i.e. sewage collection network and the construction of sewage treatment plants). Table 2 summarises investments in water pollution control in existing industrial enterprises and in urban wastewater projects.

23. From the perspective of total investment in water pollution control, several points can be made. First, beginning in the 1990s, total investment in water pollution control in existing enterprises increased. For example, between 1996 and 1997 it increased from about 4.7 billion yuan to almost 7.3 billion yuan. This increase was related to better enforcement of pollution control legislation, which forced polluters to clean up their operations, and improved pollution source control in key watersheds.

24. Investment in water pollution control in existing enterprises as a share of total investment in pollution control has fluctuated. In both 1997 and 1998 the share increased to about 60%, which may reflect the effects during this period of the factors identified in the previous paragraph, but overall there is no clear pattern through time.

Table 2: Investment in Water Pollution Control, 1986-1999

Year(s)	Investment in water polln. Control in existing industrial enterprises (billion yuan)	As proportion of total investment in pollution control in existing enterprises (%)	Investment in urban wastewater projects (billion yuan)	As proportion of total investment in urban environmental infrastructure (%)
Summary for 7 th 5-year period (1986-1990)	8.83	45.02	4.41	28.67
1991	2.92	41.82	1.61	28.79
1992	2.98	37.95	2.09	29.16
1993	2.94	33.58	3.70	34.81
1994	3.47	32.88	3.83	33.81
1995	4.56	37.13	4.80	36.71
Summary for 8 th 5-year period (1991-1995)	16.87 (total figure)	36.67 (averaged figure)	16.03 (total figure)	32.66 (averaged figure)
1996	4.74	37.42	6.68	39.12
1997	7.28	62.51	9.01	35.04
1998	7.17	58.75	15.45	33.89
1999	6.87	44.97		

Source: State Environmental Protection Administration

25. Since the 7th five-year plan period, total investment in urban wastewater projects has increased steadily. It reached 15.45 billion yuan in 1998, nearly 10 times the figure in 1991 and almost equal to the total for the whole of the 8th five-year plan period. Investment in urban wastewater projects as a share of total investment in urban environmental infrastructure has increased at a slower rate, indicating scope for improvement.

3. Current Environmental Financing Mechanisms

26. After more than a decade's effort, China has developed a comparatively strong mechanism for environmental financing. In concert with the deepening of China's economic reforms and the strengthening of environmental protection, there has been good progress in developing policy on environmental financing and supporting instruments for implementation as well as increasing the asset base. The government and domestic and international private sector investors have played an important role in these efforts. New mechanisms for environmental financing are emerging in line with the development of a market economy, the country's macro-economic policy and the improved co-ordination among financing institutions at different levels of government.

27. This section discusses the various environmental financing mechanisms that currently exist in China and the role played by the relevant institutions.

3.1 Mechanisms for Environmental Financing

28. The Regulations Concerning the Financing of Environmental Protection was issued in 1984⁴ and was China's first clearly defined policy and regulation concerning environmental protection funds. It was consistent with the thrust of reform of investment policy more broadly and clarified the framework for environmental investments in particular.

29. Following the identification of the eight investment channels by the State Council in 1984, the different regions and government departments have provided a significant amount of financing for pollution prevention and control, and nature conservation projects. Table 3 presents data for the period 1991 to 1999.

Table 3: Sources of Environmental Investment in Pollution Control

Year(s)		From projects under "3 simultaneous steps"*	From levy on renovations/ Redevelopment	From levy on urban infrastruct. Projects	From pollution levy fund	From retained profit under "3 kinds of waste" policy	Other invests	Total
7P th 5-yr plan period (1986-1990)		17.02 [^]	5.77	15.36	3.25	0.54	5.69	47.63
	%	35.72	12.11	32.25	6.83	1.16	11.93	100
1991		5.85 [^]	1.72	5.58	2.03	0.21	1.62	17.01
	%	34.39	10.12	32.79	11.93	1.25	9.52	100
1992		6.95 [^]	1.79	7.15	2.48	0.22	1.97	20.56
	%	33.81	8.73	34.78	12.06	1.05	9.57	100
1993		8.80 [^]	2.09	10.63	2.91	0.32	2.14	26.89
	%	32.73	7.77	39.54	10.81	1.19	7.96	100
1994		10.73 [^]	2.48	11.31	3.25	0.33	2.61	30.71
	%	34.94	8.07	36.83	10.58	1.09	8.49	100
1995		12.61 [^]	2.86	13.10	3.44	0.46	3.04	35.51
	%	35.54	8.07	36.85	9.69	1.29	8.56	100
Summary for 8P th 5-yr plan period (1991-1995)		44.94 [^] "	10.94	47.77	14.11	1.54	11.38	1130.68
	%	34.28 [#]	8.55	36.16	11.01	1.17	8.82	100
1996		12.87 [^]	1.65	17.08	3.96	0.67	44.63	80.86
	%	31.52	3.93	41.85	9.07	1.64	11.35	100
1997		14.33	1.25	25.72	4.58	0.92	3.44	50.24
	%	28.51	2.49	51.20	9.12	1.84	6.85	100
1998		15.26 [^]	1.26	3.89	4.97	0.93	3.97	30.28
	%	23.38	1.94	59.40	7.59	1.43	6.09	100
1999		19.90	1.68	47.89	5.46	0.87	6.52	82.32
	%	24.17	2.05	58.18	6.63	1.06	7.91	100

Notes: * Also includes pollution control investments in existing enterprises.

[^] Unit of the figures along the row is billion yuan.

" Figures along the row are totals.

[#] Averaged % shown along the row.

Source: Editorial Committee of the China Environmental Yearbook, 1996-1999.

⁴ See section 2.2 of paper.

30. There is a discrepancy between the data on sources of investment and finance within the statistics on environmental protection and those for the 8 channels of environmental financing. The following discussion seeks to clarify this discrepancy by reference to each of the sources of environmental investment identified in Table 3.

31. First, the “three simultaneous steps” regulation. As noted previously, this requires that measures for preventing and controlling pollution shall be included in the design, construction and operation of projects and that operational discharges shall conform with the relevant standards set by the competent authority (state, province, municipality or autonomous region).

32. A comprehensive environmental management system for construction projects has been established that includes regulations and requirements covering environmental impact assessment, preliminary design and project completion and inspection. Construction plans prepared by national and sub-national government are reviewed by construction departments, banks, local environmental protection bureaus (EPBs) and other institutions at different levels to ensure compliance with the requirements of the “three simultaneous steps”. There is now 100% conformity with this regulation, which not only generates environmental benefits but also raises considerable revenue.

33. Table 4 shows the proportion of revenue derived from the “three simultaneous steps” regulation to the total investment in construction and in environmental protection for the period 1991-1999.

Table 4: Revenue from the “Three Simultaneous Steps” Regulation as Share of Total Investment in Construction Projects and Environmental Protection, 1991-1999

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Revenue from 3 simultaneous steps (billion yuan)	4.45	5.55	7.49	8.85	10.12	11.08	12.88	14.20	19.16
Share of 3 simultaneous steps revenue to total investment in construction projects (%)	4.18	3.99	3.51	3.74	3.93	3.69	5.31	4.07	4.47
Share of 3 simultaneous steps revenue to total investment in environmental protection (%)	26.15	27.00	27.87	28.82	28.53	27.15	25.63	21.75	23.28

Source: Editorial Committee of China Environment Yearbook, 1996-1999; State Statistics Bureau, 1992-1999.

34. Revenue from the “three simultaneous steps” regulation is a stable source of funds, exhibiting steady growth through time (see Table 4). As a proportion of total investment in construction projects, it has essentially remained at about 4 % (the exception being in 1997) and indicates that the contribution from this source has become a steady component of funding for such projects. It should be noted that the revenue stream from the “three simultaneous steps” regulation is closely linked to the scale and actual construction of new projects: the bigger and more numerous the projects the larger the payments due under the regulation. The share of revenue from the “three simultaneous steps” regulation to total investment in environmental protection has trended down overall from a peak of 28.82% in 1994. This suggests that other sources of investment in environmental protection have increasingly displaced this one in importance.

35. Table 3 earlier listed environmental investments in construction projects subject to the “three simultaneous steps” regulation, including those for pollution control in existing enterprises. Table 5 shows just the latter.

Table 5: Environmental Investments for Pollution Control in Existing Enterprises, 1991-1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Polln control investments: existing enterprises (billion yuan)	1.40	1.40	1.31	1.88	2.49	1.78	1.45	1.06	0.74
Proportion of polln control investment existing enterprises to the total investment in environmental protection	8.24	6.81	4.87	6.12	7.01	5.03	2.88	1.63	0.90

36. The table shows that investment in pollution control in existing enterprises trended down after a peak in 1995. The investment figure in 1999 was less than one-third that of 1995. A similar trend occurred concerning the proportion of pollution control in this sector to investment in environmental protection. This reflects the intense efforts made to control pollution from older enterprises, reinforced by the State Council’s 1996 decision that all industrial pollution sources nationwide must comply with relevant state and local standards by the year 2000.

37. Table 6 shows the proportion of investment in environmental projects to the total national investment in such projects for the period 1991-1998.

Table 6: Proportion of Investment in Environmental Projects to Total National Investment in Environmental Projects

	1991	1992	1993	1994	1995	1996	1997	1998
Investment in environmental projects (billion yuan)	5.85	6.95	8.80	10.73	12.61	12.87	14.33	15.26
Proportion of investment in environmental projects to national investment	2.76	2.31	1.91	1.67	1.70	1.49	1.44	1.28

Source: Editorial Committee of China Environment Yearbook 1996-1999; State Statistics Bureau, 1997-1999.

38. References to tables 3, 4, 5 and 6 shows that revenue from projects subject to the “three simultaneous steps” regulation has been the main funding source for investments in pollution control. In percentage terms, however, the contribution from this source is trending down. Table 3 shows that it averaged about 35% both the 7th and 8th five-year plan periods but this fell to 28.5% in 1997 and as low as 23.3% in 1998 before recovering slightly in 1999 to just under 24.2%. A possible explanation is the decline

in investment in existing pollution sources and on the expansion of alternative financing sources. In addition, it may reflect a shift towards more modern, higher technology industries that are also less polluting.

39. A second factor concerning the discrepancy is funds sourced from the renovation and redevelopment of enterprises. Each year, the economic commissions and industrial and transport departments at different levels of government, relevant local government departments and enterprises invest 7% of funds from this source in pollution control. For enterprises that emit a high volume of pollutants the proportion to be invested may be increased. The enterprise can supplement these funds from its own resources. This fund has played an important role in the modernisation of, and improvement of pollution control in, older enterprises.

40. Table 7 shows the proportion of this fund that was used for pollution control investments between 1991 and 1998. Note that revenue collected under the “three simultaneous steps” regulation is also included, which inflates both the total and percentage figures.

Table 7: Funds from Levy on Enterprise Renovation and Redevelopment used for Environmental Investments, 1991-1998

	1991	1992	1993	1994	1995	1996	1997	1998
Levy from renovat/redevpt (billion yuan)	1.72	1.79	2.09	2.48	2.86	1.60	1.25	1.26
Total invest. in enterprise renovat/redevpt (billion yuan)	102.32	146.11	219.58	291.86	329.93	362.27	392.19	451.66
Proportion of investment in environmental protection (%)	1.68	1.23	0.95	0.85	0.85	0.44	0.32	0.28
7% contribution sourced from total invest. in enterprise renovat/redevpt (billion yuan)	7.16	10.22	15.37	20.43	23.09	25.36	27.45	31.61

Source: Editorial Committee of China Environment Yearbook, 1996-1999; State Statistics Bureau, 1997-1999.

41. Reference to tables 3 and 7, shows that since the 8th five-year plan period, funds from the levy on enterprise renovation/redevelopment projects declined, although there was a slight increase in 1999. This is also the case in considering its proportionate share of total environmental investment (see Table 3). At the same time, the proportion of investment sourced from the levy on enterprise renovation/redevelopment has not only failed to attain the required 7% level but has also exhibited a downward trend (see Table 7). This source has underperformed.

42. A third factor is the levy on urban infrastructure projects. The urban maintenance fee collected in large- and medium-sized cities is used for financing pollution prevention and control projects as well as the construction of environmental infrastructure, such as power plants, sewage treatment plants and hazardous waste management facilities. The revenue stream has steadily increased in real and percentage terms between 1991 and 1998 (see Table 8).

Table 8: Revenue from the Levy on Urban Infrastructure Projects, 1991-1998

	1991	1992	1993	1994	1995	1996	1997	1998
Revenue from levy on urban infrastructure projects (billion yuan)	5.58	7.15	10.63	11.31	13.08	17.08	25.72	38.89
Proportion of levy revenue to the total investment in urban construction (%)	32.79	39.54	39.5	36.83	36.85	41.85	51.20	59.56

Source: Editorial Committee of China Environment Yearbook, 1996-1999.

43. Investment in urban environmental infrastructure projects is sourced mainly from the urban maintenance fee and allocations from local government. From tables 3 and 8 it can be seen that the total investment in urban environmental infrastructure projects has increased through time, with a large jump in both 1998 and 1999. The proportion of investment in urban environmental infrastructure projects has also trended up, reaching almost 60% in 1998 (see Table 8). This shows that local governments have attached great importance on the construction of urban environmental infrastructure and have increased their contributions. On the other hand, there is a large amount of catch-up required. For example, the treatment rate for sewage in urban areas was only 30% in 1998. The remaining 70% was discharged directly into water bodies without any treatment. Waste collection was only 60% in the same year, with landfilling the principle “disposal” method practiced. In some large- and medium-sized cities the rubbish collection service is inadequate

44. The fourth factor is funds derived from the pollution levy system. The system was established in 1979 and has evolved to include supporting laws and regulations and to cover more than 100 items subject to relevant discharge standards within the categories of waste water, gas, solid waste, noise and radioactive materials. It is applied nation-wide. In accordance with the relevant regulations, 80% of the money collected from enterprises is recycled to them in the form of a subsidy to fund investment in pollution control projects. The remaining 20% is used for capacity building in local environmental protection bureaus. Overall, the pollution levy system has been effective in raising revenue to subsidise pollution control projects and finance environmental protection measures. In 1999 about 5.5 billion yuan was derived from this source. Table 9 summarises the collection and disbursement of revenue between 1991 and 1999.

45. Table 9 shows that from 1991 to 1999, a sum of 32.98 billion yuan was collected by the pollution levy system, of which 12.73 billion yuan was contributed from charges for wastewater discharge in excess of the relevant standards. Expenditure totaled 31.18 billion yuan, of which 17.99 billion yuan was used to subsidise pollution control investments and 13.19 billion yuan to fund environmental protection projects. By the end of 1998, more than 220,000 pollution control projects had been subsidised from the revenue collected under the pollution levy system. These projects have an annual treatment capacity of 17 billion tons of wastewater, and play an important role in improving water quality.

Table 9: Collection and Disbursement of Revenue from the Pollution Levy System, 1991-1999

Year	Total funds: polln levy system (bill. Yuan)	Revenue from that part of polln levy for exceeding wastewater discharge standard (billion yuan)		Disbursements (billion yuan)		Of which:			
						Pollution control subsidy (billion yuan)		Environmental protection subsidy (billion yuan)	
						Expenses	%	Expenses	%
1991	2.01	1.00	49.8	1.76	87.6	1.20	68.2	0.56	31.8
1992	2.38	1.18	49.6	2.14	89.9	1.40	65.4	0.74	34.6
1993	2.68	1.23	45.9	2.45	91.4	1.51	61.6	0.94	38.4
1994	3.10	1.32	42.6	2.67	86.1	1.62	60.7	1.05	39.3
1995	3.71	1.50	40.4	3.19	86.0	1.77	55.5	1.42	44.5
1996	4.10	1.55	37.8	3.96	96.6	2.32	58.6	1.64	41.4
1997	4.54*	1.64	36.1	4.58*	100.9	2.66	58.1	1.92	41.9
1998	4.91*	1.64	33.3	4.97*	101.1	2.73	54.9	2.24	45.1
1999	5.55	1.67	30.1	5.46	98.4	2.78	50.9	2.68	49.1
Total	32.98	12.73	40.62 (avrge)	31.18	93.11 (avrge)	17.99	59.32 (avrge)	13.19	40.68 (avrge)

* Excess expenses funded from surpluses accumulated in previous years.

Source: Editorial Committee of China Environment Yearbook, 1992-1998.

46. Profits retained from the comprehensive reduction and reuse of waste under the “three kinds of waste” policy is the fifth factor. The policy is an example of integrating environmental and economic objectives. In December 1979, in a bid to encourage industrial and mining enterprises to reduce and re-use waste the government issued regulations stating that the profits realised through such actions could be retained by enterprises and invested in environmental protection projects. Enterprises could also apply to banks for preferential loans to reduce pollution and to implement waste management projects. In 1987, the government issued another regulation authorising a one-time grant to state-owned enterprises to assist them in implementing waste reduction and re-use projects.

47. Overall, these measures have played an important role in strengthening waste management practices within enterprises as well as generating funds for investment. However, the funds raised are relatively small and contribute about 1% to the total sum of investment in environmental protection (Zhang Kunmin, 1992).

48. The sixth factor is loans from banks and financial institutions for pollution control projects, including those under the “three kinds of waste” policy. In Table 3 this source of funding is listed under the category “Other investments” rather than isolated as a separate item.

49. Prior to 1996 it was very difficult to obtain bank loans for pollution control projects. In recent years, however, financial institutions have established credit policies supporting environmental investments and offered preferential credit conditions to enterprises undertaking pollution control projects. In addition, the State Development Bank provided a special loan to enterprises for pollution control in the Huaihe River basin, and for the construction of sewage treatment plants and the control of key pollution sources (see Box 1).

Box 1: Special Loan for Pollution Control in the Huaihe River Basin

In accordance with the Water Pollution Control Plan for the Huaihe River Basin included in the 9th five-year plan, the State Development Bank allocated a special loan of 1.264 billion yuan to support pollution control projects in the four provinces along the Huaihe River. Of this sum, 0.963 billion yuan went to the State Planning Commission with SEPA responsible for the selection of projects. A further 0.3 billion yuan went to the State Economic and Trade Commission, which was given responsible for project selection. Between 1995 and 1996, the State Development Bank approved 22 projects proposed by the State Planning Commission, with loans totaling 0.198 billion yuan.

In 1997, the State Council arranged a special loan of 1.9 billion yuan for the construction of sewage treatment plants in urban areas on the banks of the Huaihe River and a loan of 0.3 billion yuan for the control of industrial pollution sources in the poorer counties. Contributions were sourced equally from central and local government. By the end of 1997 loans had been made to 40 enterprises. A further 0.2 billion yuan was appropriated from the central budget by the State Council in 1997 to fund other work in the river basin.

Local governments and enterprises also raised 0.23 billion yuan for upgrading water treatment facilities in small chemical fertiliser plants along the Huaihe River. There were 79 projects that had been funded in 1997.

Source: Editorial Committee of China Environment Yearbook, 1997; 1998.

50. The special fund for pollution control is the seventh factor. This refers to the special fund allocated by the State Planning Commission and some provinces and municipalities for the control of key pollution sources. Usually a certain sum of money is transferred from the budgets of these organisations and used to fund pollution control measures or as a special loan to support large or important or urgent environmental protection projects. With the government paying increasing attention to environmental issues, including pollution control, this fund has grown quickly in recent years. A number of provincial and municipal governments have carried out environmental protection projects financed from the special fund (See Box 2).

Box 2: Local Government Initiatives Based on the Special Fund for Pollution Prevention and Control

In recent years, several local governments have increased their financial allocations for environmental protection and have established special funds for pollution prevention and control. The Shanxi provincial government allocated 30 million yuan annually for more than 10 years for pollution control projects. In 1996, this sum increased to 35 million yuan. The Shandong provincial government has committed itself to allocate 40 million yuan each year to support pollution prevention and control projects in local water basins. Jiangsu and Guangdong and other provincial governments have stated that they will each allocate 20 million yuan annually as a special fund for pollution control. Shaanxi province has set aside 10% of its income as a special pollution control fund. In similar vein, the Fujian provincial government allocated 20 million yuan each year during the 9th five-year plan period (1996-2000) to fund pollution control measures. This was managed by the province's environmental protection bureau and bureau of finance. The provinces of Sichuan, Anhui, Hebei, Jiangxi, Zhejiang, Hainan, Henan, Guizhou and Qinghai as well as the autonomous region of Inner Mongolia have also allocated special funds for pollution control projects, important environmental construction projects and pilot projects.

Source: Editorial Committee of China Environment Yearbook, 1997.

51. The final factor concerns funds for capacity building in environmental departments and related matters. Each year a certain amount of money is allocated for environmental monitoring, environmental science research, public education and awareness raising, nature conservation and the construction of warehouses for storing radioactive wastes, etc. In addition 20% of the revenue collected by the pollution levy is used for capacity building.

52. The eight channels for environmental financing discussed above are linked to developments in the national economy. This linkage occurs firstly in the flow-on effects of increased construction activities, which generates increased revenue for projects subject to the “three simultaneous steps” regulation and the levy on renovations/redevelopment of existing enterprises. The second linkage is through structural changes in the industry sector, especially plant modernisation and improvements in the efficiency of enterprise operations through adoption of cleaner production, improved management practices and better maintenance of equipment. These factors impact on the volume of pollution discharged and the amount of non-compliance charges to be paid.

53. Possibilities for environmental investment are undergoing reform in parallel with changes in the broader economic system. With respect to the former, a number of new developments have occurred.

54. First, the range of potential investors has widened. With changes in the structure of enterprise ownership, there is the possibility for investment by various kinds of economic actors (private, public) and different kinds of investors (direct, portfolio; local, foreign).

55. Second, there is increased diversity in channels for investment. Tax reform has decentralised revenue collection and expenditure channels. Rather than the state having sole control over investment funding through budgetary allocation, new possibilities include loans from banks, the use of bonds and financial instruments by local governments to raise funds, contributions from an enterprise’s profits, the use of foreign-sourced funds (joint ventures, grants, loans), joint investment involving government departments, regional government and enterprises, and build-operate-transfer (BOT) projects.⁵

56. Third, investment decision-making is no longer centralized and the procedure has been simplified. The responsibilities of the different actors have been clarified: central and local government and their departments, enterprises, banks, etc.

57. Fourth, the different goals of state-owned and private enterprises are recognised. The latter are more entrepreneurial and competitive and the profit incentive is stronger.

58. Against this background China has made progress in implementing new instruments for environmental financing. The issuing of government bonds is an example. With the steady development of China’s economy, investors’ confidence in its government bonds has grown. This has provided a foundation for issuing bonds for the construction of infrastructure projects, which has introduced a new means of financing environmental investments. In 1999 the government issued bonds valued at 60 billion yuan, the proceeds of which were used mainly for the construction of environmental infrastructure (see Box 3).

⁵ Common for the development of highway, power plant, wastewater treatment plant projects.

Box 3: Government Bonds as a Means of Financing Environmental Investments

In 1999 the government issued bonds valued at 60 billion yuan to increase funds available for investment in environmental infrastructure projects. The funds supported pollution control projects in the three rivers and three lakes identified as priorities in the China Transcentury Green Engineering Program, environmental improvements in Beijing and promotion of a local environmental goods and services industry. Approximately 13.8 billion yuan of revenue from the government bonds were committed to these projects, accounting for 23.1% of the overall value of the bonds.

Source: China Environmental Bulletin, 1999.

59. A second example concerns the use of the BOT approach. In the 8th five-year plan period the State Development Planning Commission proposed the introduction of foreign investment via the vehicle of BOT as a means to improve investment in infrastructure. The central government has attached great importance to, and given strong support for, BOT projects. The first BOT highway project in China started operating in October 1995. BOT and build-operate-rent-transfer (BROT)⁶ projects have also been developed in the area of environmental infrastructure in China, notably for urban water supply and wastewater treatment. They are an increasingly important financing channel for environmental investments (See Box 4).

60. Financing through floating companies on the stock exchange is another recent development. In 1996 the Shenyang Special Environmental Protection Equipment Manufacturing Company became the first environmental enterprise to be floated on the Shanghai and Shenzhen stock exchanges. By 1999, 30 enterprises related to environmental protection had been listed on these exchanges. Overall, their business performance has been good (see Box 5) and this has given confidence to investors. The consolidation of this source of environmental financing has helped diversify funding sources away from the government-led situation that dominated in the past.

61. China has established many kinds of environmental funds, such as government funds, investment funds, the special fund for pollution control and environmental foundations. The sources, financing mechanisms, investment focus and operations vary from one fund to another. Further details on the range of environmental funds that currently exist in China and their characteristics is found in Gao et al. (2000)

62. The inflow of foreign investment targeting the environment sector has also been a new development. An increase in such funds was especially noticeable during the 8th five-year plan period as international financial institutions and foreign governments showed a clear preference for including the environment sector in their loans. In the 8th five-year plan period, US\$1.177 billion of foreign funds was committed to environmental projects; during the first 4 years of the 9th five-year plan period this sum had increased to US\$4 billion.

63. These examples highlight the evolution in the sources of environmental financing that are underway in China. Government sources remain significant, albeit reduced in size, complemented by a growing range of private sector and financial market options. Their further development is linked to changes in the broader economy, especially the policy framework governing investments.

⁶ Differs from BOT in that the investor will rent the facility upon its completion and its management will be by a third party.

Box 4: Examples of BOT and BROT Projects in China: Urban Water Supply and Wastewater Treatment Plants

Year	Project Name	Type of project	Investment Value (US\$ million)	Developer
1994	Tanzhou water supply	BROT	13	New World Development/Lyan Waters
1994	Harbin water supply	BOT	30	SAUR International
1995	Chongqing water supply	BOT	25	New World Development/Lyan Waters
1995	Nanchang wastewater treatment plant	BOT	11	New World Development/Lyan Waters
1995	Shenyang water supply	BROT	32	New World Development/Lyan Waters
1996	Shanghai Dachang wastewater treatment plant	BOT	73	Thames Water/BOVIS
1996	Nanghai water supply	BOT	16	Giantmost Ltd
1997	Tianjin water supply(Liangzhuang water works)	BOT	13	Vivendi
1997	Lianjiang water supply	BOT	13	New World Development/Lyan Waters
1997	Xiejiang water supply	BOT	13	Cheung Kong Infrastructure Holding
1997	Fushun water supply	BOT	13	Cheung Kong Infrastructure Holding
1997	Shenyang Shifuoshi wastewater treatment plant	BOT	13	Cheung Kong Infrastructure Holding
1998	Zhongshan water supply	BOT	13	Zhongshang Sino-French Water Supply Ltd.
1998	Zhongshan water supply	BOT	13	Vivendi/Marubeni Waterworks Company Led.
1999	Chengdu water supply	BOT	13	Lemna/Xi Long Wastewater Treatment Co. Ltd.
1999	Guangzhou	BOT	13	

Source: World Bank

3.2 *The Role of the Different Financing Institutions*

64. Different financing institutions have been established to manage the different financing channels. There is much overlap but also differentiation. In this section we seek to clarify the role of the various institutions.

65. First, we consider the role of the central government. China's investment and financing system is progressively converging with that of a market economy and the ethos of central planning and direct control could gradually decrease over time. In the field of environmental financing the central government's role is most evident in policy-making and providing guidance and it retains a decisive role through direct intervention and control. This is especially evident in the case of financing projects of national environmental importance. An example was the government's strong funding of water pollution control projects in the Huaihe River and other water basins in the 9th five-year plan period.

Box 5: Performance Characteristics of Some Listed Environmental Companies

According to the 1999 annual report of the listed environmental companies they exhibited performance characteristics of:

- An overall excellent performance. They were all profitable, with a dividend of 0.34 yuan per share which was 1.7 times the average of all companies listed on the Shenzhen and Shanghai stock exchanges;
- A high rate of profit growth. The average rate of net profit growth was 20.77%. The profits of environmental companies such as Shenzhen Xilin, the Red Sun Group, the Yasheng Group and Yinghao Science and Education grew by more than 50%, while the average profit growth of all companies listed on the Shenzhen and Shanghai stock exchanges was 17.28%;
- A high holding of assets. The average net assets per share of the environmental companies was 2.571 yuan, 3.54% higher than the average rate on the two stock exchanges;
- A high profit generation capacity. The average net assets earning ratio of the environmental companies was 13.79%. Of the companies, Yinghao Science and Education and Guodian Power were listed seventh and ninth respectively on the two stock exchanges. The average net assets earning ratio of all companies listed on the two exchanges was 8.32%;
- A rapid expansion in share capital. In 1999, the average rate of share capital expansion was 40.18%.

These factors have increased the confidence of investors, especially those with a medium- to long-term outlook. Irrespective of whether the environmental companies are focused on the conventional or high technology end of the market, or both, there is room for further improvement in performance.

Source: Economic Daily, 2 June 2000, p. 6.

66. Second, local governments. Most now recognise the importance of environmental protection and have set aside funds for investment in pollution control projects. Local governments implement central government policy but at the same time they are able to develop their own local environmental policy in order to collect funds for environmental improvements. This makes them a key actor.

67. Third, financial institutions such as banks are increasingly active in the environmental area. They play a role in two ways. On the one hand they implement government policy by providing preferential loans to enterprises for modernisation and redevelopment projects and on the other hand, they provide commercial loans to environmental industries that are considered good risks. Parallel with the reform of the investment and financing system in China, banks are expected in future to play a larger role in environmental financing.

68. It should be noted that China has established both policy banks and commercial banks. They play different roles in environmental financing. The former focus on providing the financial means for the implementation of central government environmental policies. In this context, their loans are usually provided on preferential terms and conditions. By contrast, commercial banks invest in projects that are expected to return a profit and this is reflected in their lending criteria. At the moment, policy banks play a larger role in financing environmental investments than commercial banks.

69. Fourth, the securities market. This is a new channel for environmental financing in China, split into two forms: the issue of government bonds and floats of companies on the share market. The further development of this channel could help reduce the financial burden on the central budget as well as offering an additional source of financing for listed companies involved in providing environmental goods and services

70. Fifth, enterprises. At present, many of the channels for environmental financing in China are related to enterprises. This includes the pollution levy on non-complying discharges, payments under the “three simultaneous steps” regulation for new projects and the levy on renovations/redevelopment of existing enterprises. All of these have increased awareness of environmental management in enterprises, although more needs to be done

71. Finally, private investors. Both domestic and foreign investors are playing a growing role in environmental financing. The successful operation of the BOT approach in China demonstrates its relevance and feasibility. It is expected that the share of environmental investments from this source will increase further in the future.

72. Overall, the government and enterprises remain the main sources of environmental financing in China. Banks and the security market are beginning to exert an influence and in the future the role of private investors will increase in importance.

4. Anticipated Environmental Financing Needs: 2001-2005

73. The government of China is presently preparing environmental strategies for the next five years and beyond. To facilitate their smooth implementation and the improvement of environmental quality it is essential that sufficient finance is available. This poses a considerable challenge.

4.1 Projected Needs

74. In the coming five years, China will strive to reduce environmental pollution and moderate environmental deterioration in major cities. To realize these objectives, it has been estimated that 1.3% of China’s GDP will need to be invested in environmental protection. This equates to about 700 billion yuan.

75. Of this sum, about 250 billion yuan would be required for investments in water pollution control, 260 billion yuan for air pollution control, 90 billion yuan for the treatment and disposal of solid wastes and 100 billion for nature conservation, noise control and the prevention and control of other kinds of pollution. It is anticipated that the funds would be raised from four sources: revenue collected by the “three simultaneous steps” regulation, the levies on the renovation/redevelopment of existing enterprises and on the construction of urban environmental infrastructure, and investment in nature conservation.

76. It is expected that China will invest 23,000 billion yuan in fixed assets during the 2001-2005 period. In the environmental area there are several components. First, 250 billion yuan will be invested in the new and expanded projects under the “three simultaneous steps” regulation. This will account for 33% of the total environmental investment. Second, 120 billion yuan will be needed for the renovation/redevelopment of existing enterprises. This represents 17% of the total environmental investment (an increase on the sum invested during the 7th, 8th and 9th five-year plan periods). Third, 240 billion yuan will be invested in the construction of urban infrastructure. Of this sum, 100 billion yuan will be used for the construction of urban wastewater treatment plants, 80 billion yuan for improving urban air quality and 60 billion yuan for the construction of urban waste management plants and the facilities for the treatment and disposal of hazardous wastes. Fourth, 90 billion yuan will be dedicated to institutional capacity strengthening and nature conservation.

77. Projects requiring financial support from the state or local government total 305 billion yuan, accounting for 43% of the total environmental investment. Of this amount, 100 billion yuan will come from the state and the remaining 205 billion yuan from local governments. Enterprises are expected to raise

395 billion yuan for their projects, accounting for 57% of the total environmental investment in the next five years.

78. The principles that will guide policy are: “those who destroy the ecological balance and cause environmental pollution will be responsible for the damage”, “the polluter pays” and “the polluters pay and beneficiaries compensate”. The objective is to establish a multi-sourced system of environmental investment and financing.

79. Central and local governments will be responsible for the construction of urban wastewater treatment plants, urban waste management plants, district heating schemes, hazardous waste treatment and disposal facilities, the setting aside of nature reserves, environmental monitoring and capacity building. Enterprises will be responsible for the reduction and re-use of wastes, implementing cleaner production and plant modernisation.

80. Enterprises will be expected to strictly abide by the relevant standards for pollution control and increase their contribution to environmental financing. The central government and banks will offer support in terms of returning revenue collected under the pollution levy in the form of a subsidy, providing loans and allocating foreign investment funds. Local governments will be responsible for the construction of environmental infrastructure, for regulating the prices of some primary products such as water and energy and for collecting charges for urban wastewater and solid waste treatment.

81. China should also make further use of government bonds and the share market as well as intensify efforts to attract foreign investment in the construction of urban environmental infrastructure and the environmental goods and services industry. This applies also to funding provided by international organisations and under bilateral co-operation programmes.

4.2 Reform of the Mechanisms for Environmental Investment and Financing

82. The proportion of funds for investment in new and expanded projects, for pollution control in existing enterprises and for the construction of urban environmental infrastructure in the period 2001-2005 is projected to be greater than in both the 8th and 9th five-year plan periods. The demand for environmental financing will be intense. In this context, reform of the mechanisms for environmental investment and financing should be carried out.

83. First, the existing financing channels need to be better utilised. The eight channels identified earlier in this paper have provided a large sum of funds for environmental purposes and played an important role in improving China’s environment. The deepening reform of the economic system has exposed several problems, however. For example, some of the financing channels have not been adjusted to meet changed economic conditions while others lack a comprehensive regulatory framework. At the same time, the management of the funds collected under the various channels is comparatively weak and their development has been uneven. Nonetheless, in the next five years and beyond those financing channels associated with the planned economy will continue to be important. At the same time, those financing channels that are more in line with the characteristics of a market economy, such as loans and the pollution levy fund should be further refined. In addition, more use should be made of channels such as the share market, BOT and the use of foreign-sourced funds.

84. China is currently reforming its pollution charging system, with a new focus on total pollutant discharge. This should increase considerably the revenue collected. On this basis, the subsidy derived from the pollution charge will increase.

85. Second, the role of environmental protection funds should be enhanced. Their operating procedures should be more flexible, including the authority to borrow. Many countries have established a national environmental fund. The relevant government departments in China are presently considering setting up such a fund. We consider its establishment a priority.

86. Third, the regulatory framework for environmental investments and financing should be strengthened to improve the efficiency of funds expenditure. In this respect, a comprehensive law and policy has yet to be developed. Supervisory oversight by the relevant departments also needs to be improved, focusing in particular on the EPBs and finance departments at local government level. Clear policies and guidelines need to be produced. There is currently insufficient data to determine the efficiency (or otherwise) of environmental investment in China. The improvement in the capacity to prevent and control pollution that has occurred over time does indicate that there has been progress in making such investment both more effective and efficient.

87. Fourth, several experts have suggested that centres for environmental financing should be established. The centres would be owned by the state and operate as non-bank financial institutions charged with the management and supervision of policy loans on preferential terms as well as acting as a credit institution. The aim would be to facilitate the implementation of national environmental pollution control projects and the maintenance and restoration of damaged ecosystems. Such centres are considered very important institutions for improving the efficiency of funds use, for improving decision-making on environmental investment and financing options and as an intermediate step in the transition from direct administrative intervention to indirect control through greater reliance on economic instruments. .

5. Conclusions

88. This paper has examined in detail the environmental investment situation in China as well as the different financing channels that currently exist. Although environmental investment in China has increased in recent years, reaching 1% of GDP in 1999, the sum remains modest in comparison with overall needs. Anticipated financing needs in the period 2001-2005 were discussed and, against this background, possibilities for reform of present environmental investment and financing mechanisms were outlined.

89. The eight channels for environmental investment that were adopted in 1984 have played an important role. Despite this, management and organisational weaknesses within the different investment channels need to be addressed to introduce greater operational flexibility and improved regulatory oversight. Progress has been achieved in developing environmental financing options that conform more closely to the operation of a market economy, including the BOT approach, bank loans and the listing of environmental companies on the stock exchange. These developments have paralleled reforms in the broader economic system.

90. China will require environmental investments of about 700 billion yuan in the next five years. This equates to approximately 1.3% of GDP. Achieving this goal presents a major challenge and will require existing sources of environmental finance to be used more efficiently and intensified efforts made to develop new ones.

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