

The Second Meeting of the Third Phase of CCICED

**Task Force on Financial Mechanisms for
Environmental Protection in China**

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TABLE OF CONTENTS

1. Introduction.....	1
1.1 Background ·····	1
1.2 Objectives and subjects of study ·····	1
2. Current situation and key issues in environmental investment and financing in China	3
2.1 The issue of insufficient investment ·····	3
2.2 The problem of low investment efficiency ·····	7
3. Guiding principles and overall strategies for designing financial mechanisms for environmental protection	9
3.1 Environmental financing as a tool for environmental management ·····	9
3.2 Principles of environmental financing ·····	11
3.3 Roles of the actors ·····	12
4. Conclusions and specific policy recommendations on mechanisms for financing UEI in China.....	14
4.1 Establishment and improvement of multiple channels for UEI financing mechanisms ···	14
4.2 Promoting marketization for UEI construction and operation ·····	22
5. Conclusions and policy recommendations on financing mechanisms for SME pollution control	26
5.1 Major policy-oriented conclusions ·····	26
5.2 Specific recommendations on supportive mechanisms for financing SMEs in pollution control ·····	27

1. Introduction

1.1 Background

Insufficient environmental investment has long been a bottleneck hindering environmental protection in China. Although significant efforts have been made and have led to a number of achievements, the country's environmental situation continues to deteriorate. In order to achieve the environmental objectives set down in the Tenth Five-Year Plan, a significant amount of investment is required in the field of environmental protection and pollution control. In many ways, China is on the road to establish a *well-off society*, but without introducing effective environmental measures, this may also bring about further negative impacts on the environment. In order to achieve a balance between economic growth and social development, ongoing efforts must be made for environmental protection. Also, ensuring a stable and safe living environment for the country's population has been recognized as a growing need in Chinese society. Therefore, China has set high goals and is expected to initiate further actions for environmental protection. To this end, the Government of China has identified insufficient environmental investment as a serious issue and has prioritized it in its planning agenda. In addition, positive actions to explore financial channels may provide a breakthrough for environmental protection in the country.

The conditions necessary for researching and innovating financial mechanisms for environmental protection have begun to take shape. Over the past two decades of reforms, China's economy has experienced rapid, continuous growth, and the state of citizens' incomes and governmental finances have improved remarkably. With regard to the transformation from the planned economy to a market economy, China has achieved marked success in setting up a socialist market economy primarily. In terms of environmental protection, environmental management has undergone reform and innovation, with a focus on the market economy, and in the process has accumulated valuable experience and methods in researching financial mechanisms. Accession to the World Trade Organization (WTO) has also provided China with new opportunities to utilize international capital for environmental protection.

In this context, the China Council for International Cooperation on Environment and Development (CCICED) approved the establishment of the Task Force of Financial Mechanisms for Environmental Protection in China in the first year (2002) of its third-phase activities, and the Task Force has received financial support from the Government of Japan.

1.2 Objectives and subjects of study

The objectives of the Task Force are to identify key problems faced in the field of environmental investment and financing in China, in order to create innovative approaches to solve these problems, address environmental protection priorities, and make holistic and strategic policy recommendations to the Government of China.

The results of the analysis on the current status of environmental investment and financing

illustrate that insufficient investment and low investment efficiency are the two key problems faced in this area, as discussed in detail in Chapter two. These problems are obvious in the field of urban environmental infrastructure (UEI) and pollution control in small- and medium-sized enterprises (SMEs)¹. Although the problem of low investment efficiency is not directly associated with the mechanisms of investment and financing, it directly affects the effectiveness of investment.

Therefore, the Task Force chose urban environmental infrastructure (UEI)² and pollution control for SMEs as its areas of research. It is hoped that the study will contribute to finding the solution to these problems, especially in the context of insufficient investment and low investment efficiency.

In the field of UEI, research was undertaken on how to establish a mechanism to utilize non-governmental investment entities and commercial financing approaches. It is apparent that foreign funds should also be fully mobilized for environmental protection. Regarding the pollution control in SMEs, the study focuses on establishing specialized financing mechanisms and institutional arrangements under governmental support. In addressing the improvement of funding efficiency, the study focuses on the two areas, in view of achieving market-based approaches to the construction and operation of pollution treatment facilities. It is also expected that introducing market-based approaches will increase the efficiency of the investment itself.

¹ SMEs used in this Task Force are defined according to the standard and criteria stipulated under the newly promulgated *SMEs Promotion Law of the People's Republic of China* (for further details, research studies have been conducted by Zhou Guomei and Xia Guang, 2003 "Study on the Financial Mechanisms for Pollution Control for SMEs in China" unpublished).

² The term *urban environmental infrastructure* in this study refers mainly to urban domestic wastewater treatment

2. Current situation and key issues in environmental investment and financing in China

Insufficient investment and low investment efficiency are the main obstacles blocking effective environmental protection investment and financing in China. In particular, these problems are prominent in the two fields of UEI and SMEs' pollution control. Although many other factors contribute to the problem of insufficient investment, from the perspective of investment and financing mechanisms, the absence and insufficient functioning of social investment entities other than government and polluters³ and the lack of commercial financing methods could be other important contributing factors. These are closely related to the China's under-developed financial market and credit system as well as the absence of a mechanism to absorb and mobilize the capital that has accumulated in society in the process of rapid economic growth. Meanwhile, the lack of competition in the construction and operation of pollution control facilities is another important reason for the low efficiency of environmental investment in China. The above-mentioned characteristics and present situation constitute the key issues in environmental investment and financing in China.

2.1 The issue of insufficient investment

A. Investment in environmental protection⁴ in China has been increasing rapidly, but total investment is still insufficient to meet needs.

Since the 1990s, the Government of China has placed greater importance on environmental protection, and, as a result, investment in environmental protection has increased rapidly. The sum of investment in environmental protection was 360 billion RMB during the period of the Ninth Five-Year Plan (1996-2000), which is 2.6 times that of the Eighth Five-Year Plan period (1990-1995), and in 2002, it reached 1.12% of the country's gross domestic product (GDP). Investment in environmental protection increased substantially after the Government adopted a pro-active financial policy. Environmental investment (including funds for ecological construction) between 1998 and 2002 was 580 billion RMB—1.7 times as large as between 1950 and 1997—and accounted for 1.3% of GDP. The current environmental investment in China is equivalent to that of middle developed OECD countries in the early 1990s. Urban environmental infrastructure is one area in which investment is growing rapidly; its share of overall environmental investment rose from 33% in 1991 to 55% in 2002.

The current investment in environmental protection, however, is far from adequate to meet actual demand. In the Ninth Five-Year Plan period, despite the adoption of a positive financial policy, actual environmental investment did not quite reach 450 billion RMB, and in fact there

ment and solid waste disposal facilities.

³ The term *polluters* refers to enterprises and private businesses that discharge pollutants to the ambient environment.

⁴ In accordance with statistics from the environmental protection authority in China, this research defines *environmental investments* as those in pollution prevention and control, including three types, namely, investment in pollution prevention and control for newly-built industrial projects, investments by existing industrial enterprises, and investment in urban environmen

was a shortfall of 90 billion RMB compared to the amount initially planned. In the Tenth Five-Year Plan period, the investment required for environmental protection is 700 billion RMB. According to a preliminary estimate, the investment demand for environmental protection in the Eleventh Five-Year Plan (2006-2010) period is expected to be about 900 billion RMB, or 1.1% to 1.3% of GDP in the same period. If the current investment and financing mechanisms are not reformed, investment shortfalls will worsen, which may hinder the implementation of China's environmental protection plan.

B. Insufficient investment is especially prominent in the fields of urban environmental infrastructure and SME pollution prevention and control.

Insufficient investment is a problem common to many aspects of environmental protection in China, and it is especially prominent in the fields of UEI and SMEs' pollution prevention and control—the two weakest areas of environmental pollution control in China. From the mid-1990s, the focus of environmental protection was on the treatment of industrial pollution, while urban domestic pollution, such as household wastewater and solid waste, was considered a minor issue. Due to rapid urbanization, the growing problem of urban domestic pollution has become increasingly prominent, while construction of related treatment facilities has lagged far behind. This has resulted in a huge demand for funds for the construction, operation, and maintenance of treatment facilities. In industrial pollution prevention and control, attention has always been placed on the large- or medium-sized polluting enterprises (including some SMEs). No special policies exist to support SMEs in investment and financing, which has left them to face certain difficulties alone in investing and financing pollution prevention and control.

B-1 Urban environmental infrastructure is underdeveloped and faces serious funding deficiencies.

Since the introduction of its reform policies, China has undergone rapid urbanization, with the urbanization rate of the population currently at 37%. By 2010 and 2020, this rate is expected to increase to 46% and 55%, respectively. Growth in the number of cities and an expansion of existing cities will result in a corresponding increase in the volume of urban domestic wastewater and solid waste. Over the past decade, discharges of urban domestic wastewater have increased by 5% annually. In 1999, the amount of urban domestic wastewater discharged exceeded that produced by industry for the first time. In 2002, the amount of urban domestic wastewater discharged reached to 23.22 billion tons, accounting for 52.9% of China's total emissions of wastewater, and urban domestic solid waste increased by between 5% and 8%. In 2002, the amount of urban domestic solid waste generated reached 1,360 million tons. It is predicted that by the year 2020, the production of urban domestic wastewater and solid waste will increase by between 1.3 and 2 times the volumes discharged in 2000.

Existing facilities for treating urban domestic wastewater and solid waste, however, are seriously deficient, and new construction is lagging behind. By the end of 2001, the rate of primary treatment of urban domestic wastewater was merely 36.4% of the total amount produced, of which only 18% received secondary treatment. The municipal solid waste disposal rate was 58.2%, of which only 10% received sanitary treatment and disposal.

According to China's environmental protection plan for the Tenth Five-Year Plan period

(2001-2005), the treatment rate of centralized urban domestic wastewater is targeted at 45% by 2005, and the rate in cities with populations larger than 500,000 is targeted at 60%. Under the plan, the increased capacity of sanitary treatment and disposal of urban solid waste is supposed to be 150,000 tons per day. In order to realize the above objectives, China will need hundreds of billions of RMB to construct treatment facilities for urban domestic wastewater, and 45 billion RMB to invest in the construction of domestic solid waste treatment facilities. The Task Force predicts that during the Eleventh Five-Year period, the investment required in these two fields will be around 170 billion RMB. Under the current investment mechanisms and capabilities, it will be very difficult to satisfy these demands. For some local areas, the problem of insufficient funding for construction of urban environmental infrastructure will be very serious.

B-2 *Specific difficulties faced by SMEs*

SMEs play a significant role in China's national economic development plan, evident in the fact that 99% of all enterprises in China are small- and medium-sized organizations. They contribute 50.5% of the nation's GDP and 76.6% of total value-added by industry and 43.2% of revenue, as well as 57.1% of commodity sales value. Most job opportunities are found in SMEs, which is over 75% the corporate employment rate. Among the annual export value of 200 billion dollars in recent years, SMEs accounted for about 60%. Owing to their flexibility and innovative characteristics, SMEs are the core driving force in the nation's industrial development and economic restructuring, and they play a crucial role in the optimization of resource allocation.

At the same time, SMEs are the major source of industrial pollution in China. According to preliminary estimates by the Task Force, SMEs contribute about 50% of total industrial pollution discharges, and this proportion is increasing. In contrast to large point sources of pollution, the fact that SMEs are large in number and spread out over large areas has also caused difficulties in pollution management.

SMEs are predominant in sectors such as paper-making, the leather industry, electroplating, printing and dyeing, cement manufacturing, brick making, and mining for coal, ferrous and non-ferrous metals, and non-metal minerals, etc., all of which employ unsophisticated technologies but present difficulties in pollution treatment.

Industry has generally been regarded as a target area for improving environmental management, but SMEs have not been specifically identified for improvements in management and service and for implementation of the *polluter-pays principle*. Taking advantage of the recent industrial restructuring, a large number of SMEs identified as serious polluters have been given administrative orders to close down. In general, either actively or passively, most SMEs are taking positive steps towards pollution control; however, they face the critical problem of insufficient funds for taking such actions. First, their poor economic capacity limits their ability to fund pollution control by themselves. Second, it is difficult for them to obtain financial resources for pollution treatment due to its high cost and the risky nature of financing and credit. Third, SMEs are at a disadvantage because they cannot apply for government funds for environmental protection, nor can they benefit from subsidies provided by local governments.

B-3 Lack of sound investment and financing mechanisms is an important cause of insufficient investment in environmental protection in China.

Insufficient investment in environmental protection in China is mainly caused by the excess demand for investment and the undeveloped state of current investment and financing mechanisms. Since these mechanisms are controllable and changeable over time, they were chosen as the focal point of this Task Force.

The large demand for funding is determined by the severity of China's environmental situation and quality as well as the Government's environmental protection objectives. Now experiencing rapid economic development, China must face not only the problems emerging from industrialization (e.g., industrial pollution, urban domestic pollution, destruction of ecological systems), but at the same time it also faces newly-emergent problems, including global environmental issues. In this context, China faces environmental challenges that are more severe than those experienced in any developed country. In order to solve such complex environmental problems, a large amount of investment is needed. On the other hand, economic growth continues where rapid urbanization is shaping the creation of an affluent society. In addition, in order to satisfy the needs of social development in China, environmental objectives must be set high.

The shortcomings of existing investment and financing mechanisms are the most significant causes of insufficient investment in environmental protection today. As the country develops a clearer picture of its needs for environmental protection, and as China makes progress with reforms of its economic system (including overall national investment and financing systems), the future structure for environmental investment and financing is taking shape in China, with the involvement of multiple investment entities, financing channels, and instruments. The multiple entities include governments, environmentally-liable social entities (e.g., polluting enterprises), and non-environmentally-liable social entities (e.g., enterprises and other profit-oriented and non-profit organizations). The multiple channels and instruments include public budgets, environmental levies (from enterprises and non-profit organizations for pollution discharge and from urban residents for wastewater treatment and waste disposal), treasury bonds, government loans, funds from enterprises, enterprise loans, and private funds, etc.

In terms of the roles played and contributions made by the entities and various instruments, however, the current mechanisms reflect the following characteristics: (1) they mainly rely on measures and channels under governmental plans, e.g., public budgets, environmental levies, and treasury bonds, etc.; (2) measures related to non-environmentally-liable social entities and public fund-raising approaches are either insufficient or non-existent; and (3) levy systems for urban domestic wastewater treatment and waste disposal are still at an initial stage and they have not been fully utilized. According to initial estimates, about 60% of urban solid waste is subject to a levy to pay for treatment, with the price ranging between 0.2 to 1.2 RMB per ton, while only about 16% of waste is subject to a levy for solid waste treatment and disposal.

The above-mentioned problems in investment and financial mechanisms are the main causes for the insufficient investment in environmental protection, particularly in urban

environmental infrastructure. According to a study, governmental and public funds account for more than 70% of the expenditures for environmental protection in China. Conversely, in countries under a market-based economy, such as the United States and the United Kingdom, the private sector accounts for 60% of pollution abatement expenditures. Although financing has been increasing significantly in recent years, mainly through governmental channels, the huge need for investment in urban infrastructure construction in China has barely been satisfied. Investment in urban environmental infrastructure mainly relies on tax revenues, local financing, and treasury bonds. Over the past decade, investment in urban environmental infrastructure increased rapidly. In terms of SME pollution control, the shortage of funding is mainly caused by the unfavorable position of SMEs, under the current financing and investment system and mechanisms for industrial pollution control. Low environmental awareness and weak enforcement of environmental laws also contribute to the lack of incentives for corporate investment in pollution control.

2.2 The problem of low investment efficiency

Due to the growing demand for financing, and despite inefficiencies nationwide, China has started to introduce market-based approaches for pollution prevention and control. The low efficiency of environmental investment in China is mainly reflected by inefficiencies and problems in the construction, operation, and management of urban wastewater treatment and solid waste disposal facilities as well as in industrial pollution treatment facilities.

For years, in the field of urban environmental infrastructure, the government has been the main source of funding for construction of these facilities, with non-profit organizations⁵ responsible for their operation and management. This type of government monopoly excludes institutional competition, which in turn contributes to the problem of low investment efficiency. In this regard, similar situations have occurred in the past in developed countries—and in some cases still exist. But the problems formed under the planned economy are especially complicated and severe. In industrial pollution control, China implemented a single basic policy that states that the polluter is the one responsible for treatment, and, subsequently, all polluting enterprises built and operated their own treatment facilities. Little consideration was given to leaving pollution treatment to specialized enterprises through a levy mechanism, which could bring about efficiencies in the division of labor and economies-of-scale into full play. Because of this, implementation of the “polluter treats pollution” policy caused investment inefficiencies for SMEs. The emergence of this situation in China was clearly associated with the development process of the environment-related service sector.

With the advancing reforms of the market economy system and the ongoing development of the environmental service industry, a pattern of so-called “*marketization*”⁶ emerged in China

tal infrastructure construction projects.

⁵ In brief, *government affiliated non-profit organizations* refers to a category of public services operated according to governmental mechanisms, whose finance is provided by the government, and whose human resources are managed by the government.

⁶ The term “*marketization*” derives from the process of a planned economy to a market-based economy in specific circumstances in China. This includes the “utilization of economic instruments based on market mechanisms,” the “corporatization/privatization of public and or government run sectors”,

for pollution treatment at the end of the 1990s, based on international trends favoring practices such as PPP and PFI⁷. In the field of urban environmental infrastructure, marketization is contributing to a break-up of the government's monopoly structure. This was carried out at three levels: (1) levying urban residents for household wastewater treatment and waste disposal and opening up the development of urban environmental infrastructure through public bidding; (2) demolishing the system of government-dominated construction and operation by introducing competitive mechanisms (i.e., enterprises⁸ take over commercialized management of existing facilities); (3) encouraging the participation of other economic entities⁹, apart from government agencies, in the construction and operation of the facilities, attracting capital that has accumulated in the society; and (4) establishing a management system, under which various entities participate in facility construction. The corporate operation of those facilities is also based on market mechanisms.

In the field of industrial pollution treatment, the essence of marketization is that either specialized enterprises can be chosen to treat pollution through a levy system, with division of labor and economies of scale, or enterprises can handle their own pollution treatment if it is cost-effective. The market-based approach may not only improve investment efficiency but also contribute to increasing the chances of securing financing.

Since market-based patterns could increase investment efficiency and secure financing, active reforms have been undertaken in recent years in China. Ground-breaking progress has been made in both shifting policy and practices for the marketization of pollution treatment, although these are still at their initial stages in the context of China's overall situation.

“introduction of profit-oriented capitalistic management” and so forth. It bears a broader meaning than PPP arrangements (partnership between public and private sector) or PFI (private financing initiatives). In addition, the term *marketization* has been officially adopted by the Government of China in many of its policies and documents, and widely accepted by all walks of society in China. Therefore, this study continues using the term. The terms PP

P and PFI are also used where appropriate.

⁷ PPP (public-private partnership) or PFI (private financing initiatives) refers to establishing partnerships between government departments and private sectors in the field of infrastructure improvement. PFI refers to private investment initiative or private capital participation, both of which break-up the government monopoly structure, per se, and encourage private participation in the construction and operation of facilities.

⁸ The enterprises referred to here include those established on the basis of reformed government-affiliated non-profit organizations (e.g., state-owned or state holding enterprises) and other types of enterprises.

⁹ In China, economic entities other than the public sector include state-owned enterprises, collective enterprises, private enterprises, foreign-funded enterprises, and joint ventures, etc., whose content exceeds the private sector, as frequently mentioned in the global forum.

3. Guiding principles and overall strategies for designing financial mechanisms for environmental protection

3.1 Environmental financing as a tool for environmental management

Environmental financing is a tool used to implement environmental policy, but without a proper mix of funding and technology, it cannot be effectively enforced. The scale and range of financing should be properly designed and determined according to the environmental policy goals of the state or region.

The primary objective of environmental financing is to raise the funds necessary for special environmental protection purposes, but the choice of financial instrument may have far-reaching implications, including various economic and social impacts. Therefore, financial mechanisms should be properly designed so that they can meet multiple economic and social objectives, such as the improvement of investment efficiency, correction of market and government failures, and the achievement of equity goals (i.e., income redistribution, re-adjustment of regional gaps). Among others, improving the efficiency of environmental projects is a key issue to consider in designing functional environmental financing mechanisms in China. Moreover, in the reform of its economic system, the development of environmental financing mechanisms focused on marketization is especially vital in order for China to achieve both its economic and environmental objectives. In this regard, the following strategies should be considered in order to address the problems of insufficient investment and low efficiency:

- (1) Environmental protection requirements should be met by designing financial mechanisms that incorporate the polluter-pays principle and the *user-pays principle*. Efficient financing and social equity (equity between well-off and impoverished population/regional distribution) and financial risk mitigation, should also be taken into account
- (2) The roles of the various actors in investment should be clearly defined. Among them, the Government should play a lead role by (i) implementing and enforcing environmental laws and regulations, (ii) increasing the amount of investment in its fiscal budget, and (iii) promoting financial procurement from the market.
- (3) Investors other than the Government and polluters should be encouraged in environmental investment. To this end, the establishment and improvement of market-based financial mechanisms should be given high priority.
- (4) UEI construction and SME pollution control should be designated as priorities in the efforts to establish effective environmental financing mechanisms.

Among the multiple channels available for financing and investing in environmental protection, the main ones are governmental and commercial. After two decades of stable and rapid economic development, China has witnessed a dramatic increase in the level of government financing, and the Government, at all levels, has strengthened inputs in environmental protection. It is recommended that it should further strengthen the facilitation of

the less-developed western region in environmental protection. Capacity building for environmental management and urban environmental infrastructure construction should be prioritized.

The development of commercial financing instruments should be included in development planning, and existing financial resources in the country should be mobilized for environmental protection, in particular, for the construction of urban environmental infrastructure.

In addition, in light of international experience and practices, the design of China's investment and financing mechanisms should include utilizing governmental budgets, specialized funds, or other economic measures such as policy-oriented investments, project financing, long-term financing, and foreign direct investment (see Table 1).

Table 1. Main options for environmental investment in China.

National budget or specialized fund for environmental protection	
Environment-related economic measures	Pollution discharge levies and fees on sewage treatment and solid wastes disposal
	Environmental taxes (#), taxes on products (#) with pollution, and emission trading (#), etc.
Policy-guided investment	Environmental policy-oriented investment: “three simultaneous ¹⁰ ”; fund for technical innovation ¹¹ ; revenue from integrated utilization ¹² , etc.
	Deduction of loan interest (*)
	Preferential taxation (*) and subsidies.
Project financing (#)	BOT (build-operate-transfer), BOO (build-own-operate), and TOT (transfer-operate-transfer)
Long-term capital financing (#)	Commercial bank credit, treasury bond, municipal bond, corporate bond, trust fund, multi-lateral authorized bank loans, and environmental lottery, etc.
Foreign direct investment (FDI)	
Bilateral assistance, e.g. aid provided to China by Japan	
Preferential loans from multilateral channels and international financial institutions, e.g. loan from Japan, the Asian Development Bank and the World Bank.	
Financial mechanisms under multilateral environmental agreements, e.g. the financial mechanisms under the Montreal Protocol and United Nations Framework Convention on Climate Change (GEF)	

Note: The approaches marked by “#” have not been adopted in China, or are financial approaches still under research; those marked by “*” indicate that further strengthening is needed.

¹⁰ “Three simultaneous refers to the system which the Government requires the simultaneous undertaking of principal projects pollution control facilities in the design, construction and operation of any new project.

¹¹ Enterprises in China are required to allocate 7% of their investment for pollution control during upgrading and innovation of technologies and production processes.

¹² Revenues gained from reusing and recycling wastewater and sludge could be given a preferential tax policy for enterprises investing in pollution control.

3.2 Principles of environmental financing

In order to operationalize the above-mentioned strategies, it is critical that the most effective and efficient financial instruments are chosen and applied, in order to meet the need for environmental protection in China. Implementation rules, including those for target groups and projects, must be clearly defined, and they should conform to the environmental regulatory framework such as the *polluter-pays principle* and the *user-pays principle*. To this end, the following points should be taken into consideration:

1. Environmental goals/targets - The enhancement of sanitation and public health, through both UEI and SME pollution control, is a primary goal that should be identified as a priority item on the national and local policy agendas.

2. Effectiveness - The selected instruments should be effective enough to achieve the environmental goals set by environmental policy.

3. Efficiency - The selected instruments should be most efficient, or more efficient, than existing ones, in order to achieve environmental goals.

4. Equity/fairness - Distributional effects such as the impact on the poor and the widening of regional gaps should be carefully assessed. Government support to special economic sectors such as the poor and SMEs could be justified, as it is an important role of public policy to correct market failures.

5. Repayment and cost recovery - Any funds procured by debt financing (borrowing, bonds, etc.) or by PFI must be repaid within a certain period. Environmental financing mechanisms should incorporate proper revenue-raising and cost-recovery programs. In the case of UEI, costs should be covered by user fees or transfers from the general government budget (tax revenue). User fees should be set at a level that can cover all costs for construction, operation, and maintenance, or a part of operation and maintenance. The actual level of fees should be decided considering the WTP (willingness-to-pay) and affordability for the local people. In the case of SMEs, the polluter-pays principle should be adopted.

6. Social acceptance - Support by the public and interested parties is a prerequisite, especially if the system causes a new burden on special sectors or groups of people.

7. Dynamic economic efficiency - Various economic impacts and their dynamic consequences should be considered in terms of macro-economic impacts, fiscal impacts (burden on the government's budget), and impacts on occupations, the environmental industry, and technology.

enterprises investing in pollution control.

¹³ "Three simultaneous" refers to the system in which the Government requires the simultaneous undertaking of principal projects and pollution control facilities in the design, construction, and operation of any new project.

¹⁴ Enterprises in China are required to allocate 7% of their investment for pollution control during upgrading and innovation of technologies and production processes.

¹⁵ Revenues gained from reusing and recycling wastewater, gas, and sludge could be given a preferential tax policy for enterprises investing in pollution control.

8. Administrative cost - The costs of implementation should be as low as possible.

9. Risks - Any financial mechanisms are accompanied by certain financial risks. Environmental financial mechanisms should incorporate proper measures to lower such risks, protect lenders and investors, provide credit guarantees, etc.

10. Transparency - Especially when government is involved or public funds are used, data and information should be transparent and openly disclosed.

3.3 Roles of the actors

As mentioned above, in the field of environmental financing there are various actors with different natures and functions, including the government, enterprises, consumers, and other entities. The roles to be played by these different actors should be clearly defined, paying special attention to the *polluter-pays principle* and the *user-pays principle*. Also, responsibility and subsequent obligations to be imposed upon the respective actors by such definitions should be fair (see Table 2, which shows the environmental services provided by these actors using various financial mechanisms).

Amongst many actors, the Government should play a lead role. Here, it is important to note that the roles to be played by the central government and local governments are different, although they are both lead roles. The central government must provide the legislative framework (including implementation and enforcement) necessary to achieve national environmental goals, which is the first step in defining the roles of respective actors. Also, since one of the most important aspects of environmental protection is the public interest, it should provide improved environmental services to the people, correct market failures, adjust regional gaps, etc. In environmental financing, it must guide and supervise the financial market for environmental protection, and take measures to avoid risks. Provision of urban environmental services falls under the responsibility of local government. Decentralization is a desirable trend for delegating power to local governments to conduct projects that fit local needs, but it should be accompanied with the transfer of financial power.

The marketization and corporatization of public utility services, which are currently operated by local government, should be accelerated. As enterprises are responsible for bearing the cost of pollution (according to the *polluter-pays principle*), if the Government clearly stipulates the responsibilities and obligations of enterprises in its fundamental environmental role and regulations concerning protection, they will be more smoothly facilitated to play their role in environmental protection in a concrete sense. In turn, the Government would be able to rely on a legal basis for regulating and supporting enterprises in conducting environmental protection. With regard to the role of citizens, who are also a group of beneficiaries of environmental protection, their level of WTP (willingness-to-pay) and the affordability of environmental services is rising, boosted by rising average incomes. This may result in making it easier to raise user charges for water supply, wastewater treatment, municipal solid waste collection and treatment, etc.

Table 2. Composition of entities responsible for environmental protection and investment orientation and practices in China.

Investment sectors		Investors	Cost borne by	Financing channels
Industrial pollution prevention and control		Polluting enterprises	Polluters	Self finance by polluters, pollution discharge levies, commercial financing channels, and government assistance (particularly to SMEs)
Urban pollution	Household wastewater and solid waste	Government and enterprises	Beneficiaries, with governmental subsidies	Urban pollution
	Vehicle pollution	Vehicle owner and local government	Polluters (vehicle owner and manufacturer), with subsidies from local government	Government Supervision, and Controlled by Vehicle Producers and Owners
Ecological construction and conservation	Natural reservation	Government	Government	Ecological construction and conservation
	Ecological recovery measures	Government and enterprises	Government and beneficiaries	Government Supervision, Investment and Construction with Multiple Entities' Participation
Agricultural pollution and rural environmental protection		Government	Fertilizer users, with governmental subsidies	Levy by fertilizer users, public finance, and commercial financing
Regional/river basin environmental protection		Government and enterprises	Government and responsible entities for pollution	Governmental levies on pollution discharge, levies from beneficiaries, commercial financing, private/foreign direct investment, and international assistance and loans
Implementation of multilateral environmental agreements		Government, related responsible parties, and international organizations	Government and related responsible entities	Public finance and international financial mechanisms
Environmental management capacity building		Government	Government	Governmental budget

4. Conclusions and specific policy recommendations on mechanisms for financing UEI in China

This chapter presents the results of researches on how to solve the problems of insufficient investment and low efficiency in the field of UEI. Generally speaking, the most effective ways to solve both problems are to establish and improve commercial financing mechanisms and to promote the marketization of UEI construction and operation. The research results consist of two parts: major policy-oriented conclusions, and specific policy recommendations. The former refers to the conclusions made on the basis of case studies and analysis of a large amount of data. These can be used as a valuable reference for governmental decision-making as well as the basis for specific policy recommendations. The specific policy recommendations are proposed based on policy-oriented conclusions and in such a way as to be practical and feasible. Some of them focus on national institutional arrangements and, therefore, require decisions by the central government.

4.1 Establishment and improvement of multiple channels for UEI financing mechanisms

4.1.1 Major policy-oriented conclusions

A. According to the reform of China's financial institutions and the development of commercial financing mechanisms, the tools for financing UEI projects include commercial bank loans, bonds, trust investment funds and multi-lateral authorized bank loans. These provide a multiple channel system for financing UEI.

(1) At present, if system reforms are made to improve the ability of UEI projects in terms of both borrowing loans from banks and repaying them, commercial bank loans can be an important tool for financing UEI projects, but the following system reforms are necessary:

- State-owned corporations involved in urban infrastructure development could be the borrowers eligible for bank loans, but not the juridical person of the UEI project. For a UEI project, the borrower should be different from the owner of the project. In order to increase borrowers' repayment capability, local governments should offer the borrowers preferential policies including granting them rights for developing other more profitable urban infrastructure projects, offering preference for land use, paying loan interest with government funds, providing security, and offering preferential treatment for issuing corporate bonds and assisting with financing them through stock markets.
- The principle shareholder should provide security for the loan borrower. Given this condition, the borrower is also the owner of the UEI project, but the stakeholder who owns the most shares should provide security for the borrower. Also, state-owned corporations involved in urban infrastructure development (which can be supported by local government) could be eligible warrantors or loan guarantors.

- Local governments can grant the borrowers rights to develop other profitable projects and require them to use the profits gained from these projects to repay loans.
 - The government should open up the packaging of loans to UEI projects combined with other urban development projects. For instance, an urban wastewater treatment project can be combined with an urban water supply project to apply for packaged loans from commercial banks. Repayment can be ensured by profits gained from both projects.
 - In order to increase the repayment capacity of UEI projects, several mechanisms including subsidizing interest payments, issuing corporate bonds, transforming bonds into shares, and inviting banks to act as financial advisors to the borrowers are available.
- (2) According to the trend of financial policy reform, corporate bonds will play a more important role. The government should actively make use of corporate bonds as a tool for financing UEI projects.
- (3) The Government of China has had clear policies on using trust investments to finance environmental projects. It is necessary to study the feasibility of establishing a “Public Environmental Trust Fund.” The method of raising money through the Social Security Fund can be used as a good reference. In order to establish the environmental trust fund, the Government, enterprises and urban citizens could invest jointly. The foundation of such a fund should get approval from the State Environmental Protection Administration (SEPA), and it should act as a supervisor of the fund. The Public Environmental Trust Fund should be established by means of trust investments, and should be managed and operated by qualified trust investment agencies.
- (4) There are several successful cases in which multi-lateral authorized bank loans are used for financing UEI projects. It is necessary to conduct further study on the development of relevant financial policies and successful experiences.

In the context of China’s financial institutions and policies, the financial tools mentioned above will certainly play more important roles in project financing. However, their application to UEI projects has the following limitations:

- (1) Corporate bonds, by their nature, conflict with UEI which is a public good. Since the Budget Law prohibits the issuance of municipal bonds, corporate bonds are used to finance UEI projects instead. Although enterprises issuing corporate bonds nominally assume the responsibilities for repayment and bear the risks; in practice, however, local governments offer them various types of support and subsidies. This kind of bond is essentially not a corporate bond but a kind of municipal bond, which is commonly used in other countries for financing public works. Presently in China, the examination and approval process for issuing corporate bonds is very strict. The issuance cost is often high, and the total volume of corporate bonds is still limited, and thus they cannot satisfy the large financing demands of UEI projects.

- (2) Trust investment funds are widely used in China, however, this is not the financing channel specialized for UEI projects. In addition, trust investment agencies do not play a major role in China's financial sector. Neither their scope nor their capacities can make them a major financing channel for UEI projects.
- (3) For multi-lateral authorized loans, although the depository banks do not bear responsibility for repayment, public loans are still heavily dependent on the credit standing of banks. Therefore, potential social risks exist.
- (4) Bank loans play a major role in China's financial sector and are eligible to become a major channel for financing UEI projects. From a macro-perspective, however, there are still some problems. On one hand, financial risks are too concentrated in banks. On the other hand, in view of promoting direct financing, the proportion of financing through bank loans should therefore be reduced gradually, and then private investment will increase by providing more channels for direct financing. Therefore, from the perspective of future development of China's financial sector, i.e., reducing banks' risks and increasing direct investment, bank loans cannot be depended on excessively for financing UEI projects.

B. Issuing municipal bonds is an ordinary method for financing UEI in developed countries. There is a growing feasibility of issuing municipal bonds in China.

For municipal bonds, the debtor is the local government or state-owned enterprises (such as a wastewater treatment plant, water supply company, or urban infrastructure construction and management company) that issue bonds open to the capital markets. Funds raised by municipal bonds are usually used for the construction of urban infrastructure or public utilities, including roads, bridges, water supply, wastewater treatment, solid waste disposal and other public facilities. UEI is one of the components of overall urban infrastructure. With the support of local governments, the repayment of municipal bonds can be guaranteed by several sources. Also, profits gained from other development projects can be used to compensate for UEI projects. These characteristics make municipal bonds a promising tool for financing UEI projects.

B-1 Issuing municipal bonds is a common approach in developed countries for financing UEI projects.

Issuing municipal bonds as a way to raise funds for urban public facilities has a history of more than a few decades in developed countries. In the United States, the annual investment for water utility construction (including water supply, drainage networks, treatment facilities, and basin-related works, such as dredging river courses) is U.S.\$230 billion, of which 85% is raised by issuing municipal bonds and the remaining 15% comes from government budgets. Municipal bonds in the United States not only provide a direct channel to raise private funds for UEI projects, but they also play a role in channeling private investment into more profitable urban infrastructure projects, or into UEI projects that are less profitable but provide stable returns. Financing through municipal bonds can therefore preserve government funds, which can then be used for other, less profitable urban public facilities.

In Japan, municipal bonds are called "local bonds." The share of investment through local bonds represents 20% to 40% of total investment in the construction of urban wastewater treatment facilities.

In Europe, the construction of municipal utilities has a long history, and various financing mechanisms are available. Most European countries have adopted an open policy towards issuing municipal bonds, and moreover, a number of market-based approaches are used to help in financing public facilities.

B-2 There is a growing feasibility in China to issue municipal bonds.

Based on the current trend, there is a growing notion that local governments will be given permission to issue municipal bonds.

- (1) The essence of municipal bonds is government debt. Issuing municipal bonds will help to not only establish a stable channel for financing UEI projects but also to adjust the structure of government debt, which helps to share the central government's debts with local governments. This is conducive to reducing the amount of treasury bonds and their risks, since the financial burden can be partly shared by local governments. The central government can provide the necessary support to local governments, including transferring money from the central government to relevant local governments and offering other preferential policies. .
- (2) Municipal bonds are consistent with the nature of UEI as a public good. Municipal bonds are different from other commercial bonds. Since the objective of municipal bonds is to provide financing for public facilities, their issuance and trading are often tax-free. The application of municipal bonds is often limited to pure public goods or quasi-public goods that have difficulty or are incapable of recovering their costs over a short term. UEI is typically one of these projects.
- (3) Issuing municipal bonds is useful for enabling local governments to fulfill their responsibilities, one of the major ones being to provide UEI service. Compared to other financing mechanisms, municipal bonds can better help realize governmental objectives, relate governmental responsibilities with their credibility, and strike a balance between their responsibilities and resources availability (in terms of government budget plus their financing capacity).
- (4) Municipal bonds are conducive to directly addressing the financing requirements for construction of UEI, thus reducing financing costs. Compared with other financing mechanisms, there are two reasons for its lower financing costs. On one hand, the issuer of municipal bonds is usually a municipal government or juridical person of a project who is guaranteed by the municipal government. The credibility of the issuer or the warrantor determines lower risks in issuing municipal bonds. In addition, tax preference also helps to lower the costs for interest payment. On the other hand, since the municipal bonds are issued to serve the general objectives of urban construction and development, their scale of financing is usually much larger than single project financing. Under the same conditions, the larger the scale, the lower the cost for financing.

- (5) The funding conditions and financial environment necessary for issuing municipal bonds now exist. By the end of 2002, China's national savings reached about 1 trillion RMB, equivalent to 1.02 times the country's GDP. From 1998 to 2002, the national savings showed an increase of 21% annually. The swift increase of national savings represents the rapid growth in the national economy on one hand, but has limited the channels available for private investment on the other hand. Under this circumstance, sufficient funds available for private investment provide a solid basis for direct financing through municipal bonds. In addition, China has established complete financial institutions under the market economy with a financial market system and a corresponding supervision and management system, which provide the necessary conditions for issuing municipal bonds.
- (6) The risks associated with issuing municipal bonds can be effectively controlled, but this depends on a number of aspects, first of which is the good credibility of the issuer. Municipal bonds are issued or guaranteed by a municipal government that has stable revenues from taxes and assumes the responsibility of providing public facilities. This relationship plays an important role in managing risk. Second, the use of municipal bonds usually has low risks. Municipal bonds, different from other ordinary commercial bonds that usually have no restrictions on their usage, can only be used for investment in urban infrastructure. Generally speaking, if UEI facilities can be operated and managed properly, their operating risks are far lower than other commercial projects. Third, the issuer of municipal bonds also assumes the responsibility for their management. Sustaining financial stability and reducing financial risks are important responsibilities of municipal government. In this context, a municipal government, as both the issuer and municipal governor, should bear the financial risks not only in issuing the bonds but also in their governance. Therefore, the risk control of municipal bonds pertains to not just bond risk control but social financial risk control as well, and acts as a "ruler" to indicate social financial risks. The municipal government will by all means pay great attention to controlling and balancing the risks of issuing municipal bonds.

C. Treasury bond investment has played a significant role in accelerating the construction of UEI and boosting economic growth in China. The Government should further strengthen treasury bond investments in environmental projects and limit their application. The use of this type of bond should be concentrated more on priority projects. It is necessary to increase the variety of treasury bonds and to promote market-based mechanisms for their issuance and management.

From 1998 to 2002, the central government issued a total of 660 billion RMB in long-term treasury bonds, of which 65 billion RMB was invested in the construction of 967 UEI projects, covering 95% of cities and some counties in western China. Treasury bonds not only accelerated the construction of UEI in some cities in China but also played a positive role in boosting economic growth. During 1998 to 2002, the accumulated total of long-term treasury bonds directly produced about 2,500 billion RMB in investment from local governments, relevant departments, enterprises, and bank loans. One study showed that projects funded by

treasury bonds led to a 2% increase of GDP in 1999.¹⁶

There are also problems with the use of treasury bonds. For instance, the required counterpart funding to be provided by local governments was not put in place. In addition, the application of treasury bonds is too broad and the supervision of projects funded by treasury bonds is not effective enough. In addition to risk management concerns also found in other developed countries, treasury bond issuance has another two problems seen particularly in China. The first is that local governments ask for a “lease” from the central government, or they attempt to get approval of projects from the central government and make them into the object of treasury bond investment. The second problem is that the issuance of treasury bonds relies too much on administrative tools that do not take advantage of market mechanisms for effective resource allocation. Therefore, the reform of issuing treasury bonds is urgently needed.

The use of treasury bonds should be focused on priority projects in major regions, and treasury bond investments in environmental projects should be further strengthened. In planning, priority should be given to major environmental protection projects in specific regions proposed in the Tenth-Five Year Plan for Environmental Protection. Particularly, the Government should increase the proportion of treasury bond investment in some poor regions, where the financing capacity is usually low and counterpart funding cannot be ensured by local governments.

Market mechanisms should be employed for issuing treasury bonds. Two reforms could be considered. Firstly, to diversify the treasury bonds. Special treasury bonds for the construction of UEI could be an option. In issuing the special treasury bonds, the central government should clearly define the issuer and the borrower, as well as the responsibilities and rights of the central government and the local governments. The issuing of special treasury bonds should make use of market mechanisms. Referring to practices in other countries, part of the treasury bonds can be replaced gradually by municipal bonds (see Conclusion 4.1.1.2). Secondly, to make full use of market mechanisms for the issuance and management of treasury bonds. A trusteeship experiment for treasury bond management should be conducted. In this experiment, it is necessary to select eligible agencies as investors on behalf of the Government. Detailed management procedures should be specified. Based on the experiences of in industrial investment the market mechanisms could be applied to the issuance and use of treasury bonds in order to increase their efficiency and promote their sound development.

4.1.2 Specific policy recommendations

- A. Make full use of multiple channels of commercial financing tools, such as bank loans, bonds, trust investment funds, and multi-lateral authorized bank loans, to raise funds from the market by improving relevant policies.***

Among the existing tools for multiple channel commercial financing, bank credits and corporate bonds are the two most important, and should be fully employed through the reform

¹⁶ Wang Yaoxian, Fang Zhi, Ji Min, Huang Jinlao and Tan Li, A Study on the Multi-Channel Investment in China Urban Environmental Infrastructure Construction, *in Report of the Task Force on Financial Mechanisms for Environmental Protection*, CCICED, 2003.

of relevant policies.

Bank loans play a key role in China's financial system, accounting for 90% of the total financing volume. The Government should pave the road to using bank credits for financing the construction of UEI. In addition, governmental policies of supporting environmental protection should be integrated with the requirements of risk management for bank credits. This would include:

- (1) implementing a pilot system which allows levy authority for environmental projects to be used as a mortgage for loans;
- (2) to integrate environmental projects, such as wastewater treatment and municipal solid waste disposal facilities, into the master plan for the construction of urban infrastructure (taking advantage of combined bank credits), select qualified borrowers, and adopt the system of integrated loans for urban development;
- (3) to implement the system of initial fund requirement for environmental projects and to attract funds from commercial banks in line with the national reform of the financial system and on the basis of promoting the system of project ownership, attracting private investment and promoting concession transfer;
- (4) to properly extend the purview of bank branches in issuing credits;
- (5) to include more environmental projects into comprehensive urban development programs financed by the National Development Bank; and
- (6) to make full use of governmental investment as a facilitator in the financing of commercial banks. For example, combining governmental fiscal funds with commercial bank credits in ways such as paying interest for bank loans and subsidizing the initial funds required for environmental projects can increase the financing capability of environmental projects.

The issuance of corporate bonds complies with the general direction of China's financial reforms. In the process of revising the Ordinance for Corporate Bonds, the government should design the necessary policies to facilitate corporate bonds to be used for financing the construction of urban infrastructure, including UEI. These policies include:

- (1) incorporating environmental projects into the bond issuance plan for comprehensive urban development;
- (2) selecting urban construction enterprises with high credit and strong repayment capability as borrowers according to the requirements of urban construction;
- (3) granting the borrower with the right to develop other urban infrastructure projects (non-environmental projects), allowing them to use profits gained from non-environmental projects as a repayment source for loans borrowed for environmental projects, and providing favorable land-use policies for UEI projects;
- (4) by using local governmental revenues beyond the fiscal budget, subsidizing the bond interest when the corporate bond interest rate is higher than that of the treasury bonds; and

- (5) facilitating the circulation of corporate bonds used for the construction of urban infrastructure.

B. While making full use of various commercial financing channels to raise funds from the market, the Government of China should seriously consider the introduction of municipal bonds, which would serve as a new and important channel for financing UEI.

Issuing municipal bonds is important for both the reform of China's financial system and the institutional reform of investment and financing. It will not only influence the re-allocation of financial power and responsibilities between the central government and local governments but also require revision of relevant laws and adjustment of policies. In addition, it is necessary to establish a system for evaluating the credit of local governments, as well as a supervision system and monitoring mechanisms. The Task Force therefore recommends that the State Council should require the relevant departments to study and design an implementation scheme for issuing municipal bonds. The following points should be taken into account:

- (1) Pilot projects on issuing municipal bonds should be conducted in some selected major cities in China's developed regions. In issuing municipal bonds, the volume of issuance should be strictly controlled, and the types of projects which use municipal bonds should be limited. For example, the construction of facilities for the 2008 Olympic Games in Beijing and for the Horticulture Expo in Shanghai could be good candidates for experimenting with the issuance of municipal bonds.
- (2) Supplementary policies for issuing municipal bonds should be developed, starting with creating tax incentives, including tax reduction and exemption policies, to attract investment from financial organizations and private investors. Second, the market of municipal bonds should be opened up to commercial banks, and policy support should be provided for commercial banks to invest in municipal bonds. Third, municipal bonds should be made tradable in and beyond nationwide bond market, so that they should be circulated more broadly and their risks reduced. Fourth, effective issuance and assurance mechanisms should be established for municipal bonds. It is important to promote the issue of municipal bonds through the market and properly select issuers and sellers as well as the method of issuance. In addition, it is necessary to construct a rational guarantee structure and implement guarantors' responsibilities and investors' liabilities for bearing the risks.
- (3) Mechanisms to ensure preferential use of municipal bonds should be developed to UEI construction projects. In order to prevent large amounts of funds raised by municipal bonds from flowing into more profitable sectors such as transportation and water supply, and therefore forcing less profitable environmental projects to continue facing the bottleneck of financing problems, it is necessary to integrate government intervention with market mechanisms to guarantee the funds needed for UEI construction. For example, the government could create a special environmental budget for buying bonds and offer preferential policies of guarantee.

- (4) A draft amendment bill to the Budget Law concerning the provision that “local governments shall not issue local government bonds” needs to be proposed to the National People’s Congress after it is first approved by the State Council.

4.2 Promoting marketization for UEI construction and operation

4.2.1 Major policy-oriented conclusions

A. Marketization of the construction and operation of UEI is an effective mechanism for increasing investment efficiency, and it plays an important role in project financing.

The way in which government constructs and operates UEI facilities usually results in institutional problems and low efficiency. Marketization, however, can attract private investment in UEI projects and introduce competition mechanisms, which will help increase the efficiency of UEI construction and operation.

B. Government should play a lead role in UEI construction, but marketization can be fully employed in its operation and maintenance as well as in the collection and transportation of municipal solid waste. In the process of marketization, the government should retain the responsibility of creating, regulating, and supporting the market.

Among the existing practices of marketization in China, there are two tendencies in the relationship between the government and the market. The first is that the government plays a dominant role, while the market can only play a minor one. The second is just the opposite, in which the market is regarded as omnipotent. There are also differences between regions in addressing this issue. In eastern regions, the role of the market is given more weight, while in the western part of China, construction and operation of UEI is still largely dependent on the government. Based on an examination of international experiences, as well as analysis on the feasibility of marketization of UEI conducted by some international organizations, it is clear that the Government must play a lead investment role in the construction of UEI, while the market approach can be fully adopted for operation and maintenance of urban wastewater facilities, and for the collection and transportation of municipal solid waste.

In order to create the market, the role of the government is to help transform potential demands for pollution abatement into actual demands through strengthened enforcement. Based on market principles, such as the *polluter pays principle* and the right of investors to gain profits, the government should establish a user-charge system, making arrangement of user-charge rates to ensure full cost recovery. In addition, property rights should be well-defined when changing UEI from pure public goods to price-exclusive quasi-public goods. Moreover, the government should accelerate the corporatization of the existing non-profit agencies and establish legal entity corporations for wastewater treatment plants and municipal solid waste disposal facilities.

To regulate the market, the government should design a comprehensive plan for UEI so as to avoid unorganized construction when adopting the marketization approach. It is necessary to establish rules on market access and fair competition for private enterprises’ involvement in order to avoid disorder and unfair competition. In addition, the Government should remove

administrative and territorial barriers by establishing a public bidding system, thus providing an open and fair competitive environment. Also, while regulating user-charges, the poor should also be ensured access to services.

To support the market, the Government can offer a number of preferential policies on taxes, land use and electricity pricing, and provide information and consulting services to facilitate marketization. In addition, it should establish a special catalogue or information sources for the public welfare sector and offer various preferential tax policies to different types of corporations.

C. In China's eastern region, fundamental conditions are available for wide and intensive development of marketization in the urban wastewater treatment and solid waste disposal sectors. In western China, local governments should adopt a step-by-step approach to promote marketization.

In the urban wastewater treatment and solid waste disposal sectors, the fundamental conditions exist for wide and intensive development of marketization. The following marketization models are recommended :

- (1) Governmental non-profit organizations in charge of the operation of wastewater facilities or solid waste collection and transportation should develop a corporatization approach. After the reform, enterprises can be either state-owned corporations or joint-venture stock companies with cooperation between the public and private sectors. The corporatization of governmental non-profit organizations should be implemented, otherwise the government's financial burden cannot be reduced and the quality of service cannot be improved.
- (2) Operation of existing facilities constructed by the Government and the construction of new facilities could be contracted out to corporations for cost-recovery by using the transfer-operate-transfer (TOT) model.
- (3) In areas where conditions are appropriate, new facilities could be constructed using the build-operate-transfer (BOT) or quasi-BOT models. Successful cases can be seen in the eastern regions.

In contrast, the conditions for employing the market-based approach in western China are not as advanced as in the eastern regions; however, the corporatization of government-affiliated businesses can be prioritized. In case user-charges are not sufficient enough to attract private funds, the Government can provide financial subsidies. In regard to concrete market-based models, the Government could consider, first, the use of the quasi-BOT model, and then gradually apply the TOT and BOT models. For application of specific marketization models, experiences in the eastern regions can be studied.

D. The Government should make great efforts to settle the laid-off people due to corporatization and solve tax issues.

Corporatization of governmental non-profit organizations is the major way of marketization of urban wastewater treatment and solid waste collection, treatment and disposal. There are two

common challenges that are now faced or will be faced by local governments. The first challenge is countermeasures against the reduction in employment due to corporatization. How to settle the laid-off people becomes a priority issue in the institutional restructuring process. The second challenge is the increase of tax payments. According to China's Corporation Law and Tax Law, after existing governmental non-profit organizations are restructured into legal corporate entities, they must pay income tax. Therefore, the restructured corporations will have to bear a larger portion of operational costs. These two challenges discourage local governments from promoting corporatization.

In Beijing's experience, the municipal government has made great efforts to solve these two problems in order to facilitate corporatization. The people laid-off in the corporatization process can enjoy not only the supportive policies for ordinary people laid-off during China's economic and institutional reform but also benefit from special preferential policies concerning their retirement pension and health insurance. In addition, the municipal government provides related training services to help them obtain employment in the urban construction sector or in the environmental industry sector.

4.2.2 Specific policy recommendations

In order to make use of marketization to tackle the problems related to low efficiency and insufficient investment, it is necessary to solve policy issues that occur in the process of marketization. The Task Force proposes three policy recommendations in promoting marketization of UEI construction and operation.

A. Unify existing policies and publish the "Ordinance on Promotion of Marketization of Urban Environmental Infrastructure Services."

In recent years, China published seven sets of guidelines on the marketization of providing services for urban wastewater treatment and municipal solid waste collection and disposal. From the effectiveness of their enforcement, however, the number of these guidelines may detract from their effectiveness since they may cause confusion and reduction in their authority. Without driving incentives for enforcement by local government, some key policies necessary for promoting marketization cannot be implemented effectively, particularly with the Users Pay Policy for wastewater treatment and municipal solid waste disposal, which resulted in limited collection of user fees and low tariffs, etc. In addressing such issues as corporatization, opening up of the market, access to the private sector, user-charge policy and tax preferences, it is suggested that the current leading views held by corresponding individual departments should be brought together under one integrated ordinance issued by the State Council, called the "Ordinance on the Promotion of Marketization of Urban Environmental Infrastructure Services." This ordinance should be designed to improve the authority and feasibility of enforcement, and ensure the sound development of marketization. According to the reform process of China's public utility sector, the Government should create a plan to establish a special law on the marketization of public utilities, including UEI.

B. Provide training on relevant knowledge and technology to improve the capacity of local government to implement marketization of UEI construction and operation.

The capacity of local governments to implement marketization is seriously lacking. Sometimes, a sufficient amount of time for project preparation is required, or a contract may not be signed after years of negotiation. In other cases, the contract was signed hastily without proper negotiation over some key elements, including prices, investment returns, and supervision.

In order to avoid these problems and to enhance local capacity, the Task Force suggests that the corresponding department should formulate and facilitate a training programme on capacity building for implementing the marketization of UEI services. The training programme should be designed for both local governmental officials and corporate managers. The contents of the programme can include relevant governmental policies on the marketization of urban wastewater treatment and solid waste disposal; financing for UEI; models of marketization and related advantages and risks; samples of contracts for different models (such as BOT, quasi-BOT, and TOT); key technologies for urban wastewater treatment and solid waste disposal; and supervision and management of marketization.

C. Define governmental responsibilities for implementing supervision and providing corresponding services for the marketization of UEI construction and operation.

The marketization of construction and operation of UEI requires stricter supervision and better services by local governments. If governmental supervision is not effective, serious secondary pollution may be generated by wastewater treatment and solid waste disposal, particularly from incineration facilities. In order to prevent non-compliance and secondary pollution, the UEI facilities should be regarded as polluting sources and be included in the monitoring scheme of local environmental protection bureaus. The State Environmental Protection Administration should establish standards for technical evaluation, certification, and information disclosure, and provide authoritative technological information for local governments and enterprises.

5. Conclusions and policy recommendations on financing mechanisms for SME pollution control

Presently, the major steps that need to be taken to address the problems of insufficient investment and low efficiency facing SMEs in their pollution control are to establish supportive government financing mechanisms, such as special funds, and promote market-based approaches for the construction and operation of abatement facilities. In the medium and long term, it is necessary to establish special commercial financing mechanisms for the development and pollution control of SMEs.

5.1 Major policy-oriented conclusions

A. Government should support the financing of SMEs in pollution control.

International experience shows that SMEs are generally faced with special challenges in financing their pollution control; however, some positive experiences and successful cases do exist. Drawing on Japanese experiences and good practices in China, it can be concluded that government should support financing SMEs in pollution control, which complies with the existing policy direction of encouraging and supporting the development of SMEs. Although the Government will spend money for the pollution control of SMEs, it can be compensated by higher tax revenues resulting from establishing a better environment attracting investment.

B. Government should support the pollution control of SMEs that comply with national industrial policies and that have growth potential.

In general, SMEs do not employ advanced technologies and usually generate serious pollution. A number of them are in sectors that are either restricted or prohibited by industrial policy. Not all SMEs are eligible for obtaining governmental support to finance their pollution control. The supportive policy should be aimed only to those complying with national industrial policies and that have technological potentials. In addition, the selected SMEs should have sufficient profits and play a critical role in local industrial chains. The selection work should be conducted by relevant service agencies based on specific procedures and criteria.

C. Three mechanisms can be applied for financing SMEs in pollution control: (i) direct government financing through special supportive mechanisms; (ii) raising funds from the market through commercial mechanisms that can integrate pollution control into the overall development of SMEs; and (iii) preferential policies.

To make use of supportive governmental financing mechanisms, the Task Force suggests that both proposed Development Fund for SMEs and Special Supportive Fund for the Development of SMEs can be used as financing channels for SME pollution control. In addition, the existing Special Fund for Environmental Protection can be applied to offer subsidies for SME pollution control, including subsidies for bank loans and subsidies for interest payments.

For commercial financing mechanisms, several financing tools are available to SMEs, including bank loans, security, issuing corporate stocks and bonds, as well as private investment. In addition, it is important to establish special financial agencies to provide tailored service for SMEs, e.g., an investment company for SMEs.

Preferential policies to support SME pollution control include a preferential tax policy for environmental companies that provide pollution control services to SMEs, and preferential policies on bank loans and land-use.

D. In the end, SMEs should bear the pollution control costs themselves.

Although the Government should provide supportive mechanisms to finance SMEs in their pollution control, the polluter-pays principle should also be adhered to. In this context, SMEs should ultimately bear all or most of the pollution costs by themselves. This can be an effective incentive for SMEs to improve their production and management processes. The role of the government is only to help SMEs with financing, rather than paying the pollution control cost on their behalf. Therefore, it should be clearly defined in governmental policies that SMEs should pay the final control costs themselves.

E. Service agencies should play a role in providing services for SME financing and investment.

Government need not work directly on the detailed financing procedures and can authorize service agencies to provide relevant services.

F. In order to increase investment efficiency, the Government should encourage the establishment of industrial parks for SMEs where collective pollution treatment is employed. For SMEs that practice individual or non-collective pollution control measures, the Government should encourage the introduction of models in which the operation of pollution control facilities are consigned to specialized companies.

Most of the SME pollution control facilities in China have been funded, built, and operated by the enterprises themselves (non-collective approach). This kind of approach has disadvantages in terms of low efficiency in investment and pollution control due to the lack of access to appropriate expertise in pollution treatment technology and management. Currently water management in China has been emerging in areas such as pollution control conducted by sub-contracted specialized companies and collective control facilities. These have demonstrated their strength in improving environmental investment efficiency and pollution control effectiveness because they take advantage of the merits of division of labor and economy scales. At the same time, such methods have improved and stabilized the compliance rate with industrial discharge standards, enhanced the competitiveness of these companies, and helped to improve achievements in reaching total emission control targets.

5.2 Specific recommendations on supportive mechanisms for financing SMEs in pollution control

Based on the above conclusion that the Government should support SMEs in financing their pollution control, the Task Force proposes three recommendations on supportive mechanisms.

A. *Establish special appropriations for pollution control of SMEs under both the SME Development Fund and the Special Supportive Fund for the SME Development*

In line with supportive government policies on the development of SMEs and the provisions referred to in the Promotion Law for SMEs (SME Development Fund and Special Supportive Fund) for the SME Development, the Task Force proposes the following recommendations:

A-1 *Establish a special appropriation for SMEs' pollution control under the SME Development Fund. Applications of the special appropriation include the following:*

Provide subsidies for relocating SMEs in industrial parks, which should be less than 10% of the total relocation costs.

Provide funds for preliminary construction of collective pollution control facilities. If these are planned and implemented by local governments, construction can be fully financed by the special appropriation. Local governments should entrust a specialized organization for the construction work. After SMEs move into the industrial park, the initial investment can be gradually repaid by collecting user fees, with the period of repayment set for around five to ten years.

Provide preferential loans for financing SMEs in cleaner production and pollution control technologies. If SMEs do not join in the collective pollution treatment, and when they need financing for their own pollution control, the special appropriation can provide them with preferential loans. The interest rate will be 1% to 3% less than other commercial bank loans, while the difference in rates will be covered by utilizing funds under the special appropriation.

Provide security for financing the environmental projects of SMEs through commercial bank loans. According to the Promotion Law for SMEs, providing security for financing SMEs is one of the applications of the Development Fund for SMEs. Therefore, when complying with provisions for application of the Fund, the special appropriation under the Fund allows security to be provided for commercial loans, and provision of security from other sources becomes unnecessary.

A-2 *Establish appropriation for SME pollution control under the Special Fund for Environmental Protection.*

The *appropriation for SME pollution control* should be used for the following purposes:

- construction of a service system for SME pollution control (i.e., establish environmental organizations which provide services for SME pollution control);
- research on laws and regulations relating to SME environmental management;
- providing technical guidance to SMEs;
- providing other services for SME pollution abatement.

B. *Establish appropriations for SME pollution control under the Special Fund for Environmental Protection.*

Based on the revised *Ordinance on Collection, Utilization and Management of Pollution Fee*, the Task Force suggests that priority for using the *Special Fund for Environmental Protection*, established by governments at all levels in China, should be given to SMEs for pollution control. In addition, the Task Force recommends that *appropriations for SME pollution control* should be established under the existing Special Fund for Environmental Protection, and should be used to provide grants to SMEs or to pay the interest for commercial bank credits.

Applying the Special Fund to support SMEs with the provisions on the application and scope of the Special Fund, which focuses on the abatement of major polluting sources and pollution control projects planned by the State Council. SMEs are regarded as a major source of pollution according to their share of total emissions, while, at the same time, the government has recognized and attached great importance to the sound development of SMEs because of their important role in the national economy.

In addition, other sources for supporting the Special Fund can be considered, including (1) governmental budgetary appropriation (the government can appropriate a sum of money either periodically or one time to the Special Fund) and (2) other sources. Referring to experiences in Japan, the Government can re-allocate its budget and apply those funds usually used as deposits or for providing security (such as funds provided for the elderly and for social security) to the Special Fund. These funds can then be transferred to the appropriation for SME pollution control under the Special Fund. SMEs that are funded by the appropriation should repay both the principal and the interest. The principal in the Special Fund will not decrease but will increase. In this sense, the Government budget plays an important role in providing security.¹⁷

C. Establish an organization to be in charge of both pollution treatment and financing.

The Promotion Law for SMEs prescribes that “local governments higher than the county level and affiliated agencies in charge of industrial promotion and other corresponding agencies should provide guidance and service for small and medium enterprises within their jurisdictions.” According to this provision, SME pollution control, as an integral component of SME development, should also be an important part of governmental responsibilities for supporting SMEs.

Local governments, however, usually focus their resources on construction, innovation, and market development of SMEs and overlook pollution control. Environmental agencies, on the other hand, usually regard all enterprises as being in one category without taking note that SMEs require tailored supervision and services different than large-scale enterprises. Consequently, no specialized institutions have been created to prevent and control pollution from SMEs. In order to implement the Promotion Law for SMEs, it is necessary to clearly define the responsibilities of both governmental agencies in charge of industrial sectors and environmental sectors, so that these agencies can provide guidance and support for financing SMEs in their pollution control. In addition, an “*Environmental Management Office for SMEs*” should be established within the State Environmental Protection Administration to implement

¹⁷ The feasibility of this approach needs further study and discussion.

relevant provisions in the Promotion Law for SMEs, including providing financing for pollution control. Moreover, a non-profit environmental organization should be established to implement supportive measures provided by the Government for SMEs.

D. Apply innovative approaches to utilize commercial bank credit

The use of commercial bank credit for control of pollution from individual SMEs may be uneconomical and risky due to the nature of these enterprises. The Task Force therefore recommends some innovative approaches. (1) Establish special investment companies for pollution control involving SMEs. These special investment companies would then apply for commercial bank loans and provide the funds to SMEs for pollution control. (2) An authority that collects pollution levies should provide guarantees for commercial bank loans to SMEs, in order to facilitate loan approval in the event SMEs apply directly for loans; (3) Utilize leases as one option for financing SMEs. Environmental companies in charge of controlling pollution from SMEs could apply for lease financing from the special investment companies, to allow them to pay for pollution control facilities. This would help resolve the limitation that commercial banks prefer to offer only short-term financing to SMEs. (4) A consortium of SMEs can apply for issuing bonds or apply for bank loans for the construction of an industrial park which is installed with collective pollution control facilities.