ADB Urban Innovations and Best Practices

www.adb.org/urbandev
November 2010

SUSTAINABLE URBAN DEVELOPMENT IN THE PEOPLE'S REPUBLIC OF CHINA*

Wastewater Treatment: Case Study of Public–Private Partnerships (PPPs) in Shanghai

Urbanization in the People's Republic of China

Urbanization in the People's Republic of China (PRC) has been on an extensive and accelerated path. In 2008, more than 600 million people were residing in 655 cities, pushing the urbanization level to 45.7%. Based on current trends, the urban population in the PRC is projected to cross the 1 billion mark in 2030 and eight megacities—each with a population of over 10 million—would be existing in the country by 2025 (Woetzel et al. 2008).

However, the rapid rate and sheer scale of urbanization is associated with increasingly pressing social, economic, and environmental problems. Clearly, new models of sustainable urban development are needed to cater to this phenomenal urban growth for the coming decades.

PPPs in the PRC's Wastewater Treatment Sector

Private sector participation may be brought into public projects for several reasons, for example, to compensate for and/or improve on the structural inefficiencies caused by state management, or to gain access to additional financing not provided directly by the government. For example, the modernization of urban water governance in the PRC encompasses: (i) water tariff reforms to allow the water price to reflect full costs, and to instill safeguards to ensure that vulnerable groups have access to drinking water; (ii) improvements in transparency, accountability and management by the managing authorities; (iii) enhancements to the level and scope of public participation; and (iv) decentralization of water tasks and responsibilities down to the local level.

The PRC began to deregulate the water sector in the 1990s, permitting private and foreign investment in water supply and sewage treatment infrastructure. The country's public urban water and sewerage infrastructure systems are generally under-invested and understaffed, making them largely inadequate in meeting growing demands for water and sewerage treatment. The poor infrastructure and growing demand for water supply and wastewater treatment have made the PRC one of the most active markets for PPPs. The private sector can participate in the water market through various models ranging from full privatization of government assets to public–private partnerships. Foreign investors were also permitted to hold majority stakes in joint ventures (JVs).

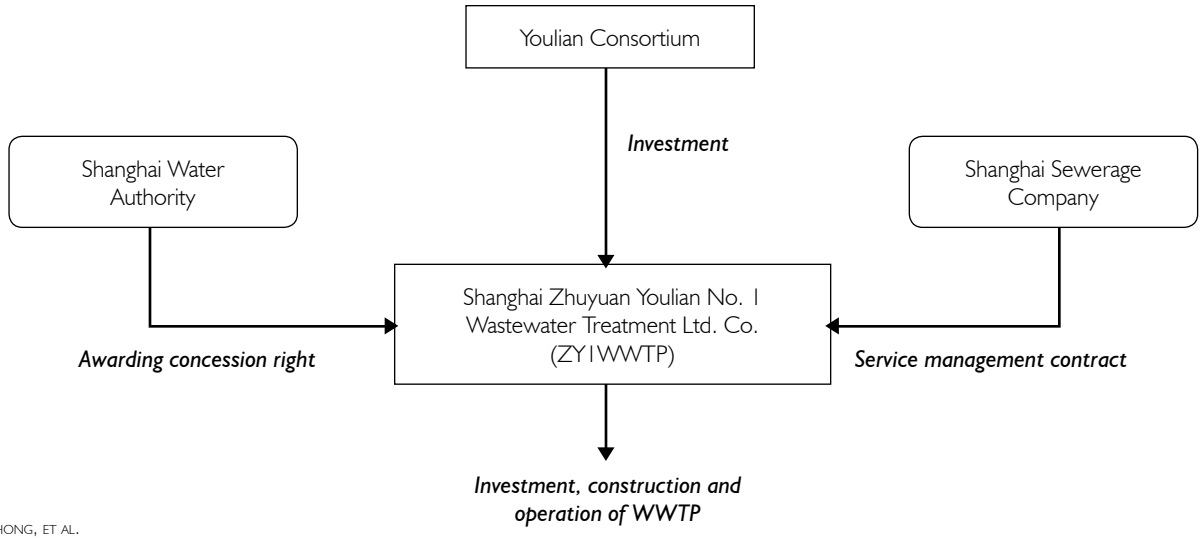
The savings generated through the PPP arrangement are reflected in the service fee, which was about 40% below the government's own projected cost.

There are currently an estimated 400 water supply and wastewater PPP projects in the PRC, although the exiting of foreign investors from the water sector, partially due to legal and regulatory restrictions, has also been noted (Choi, et al.). Companies in the water sector include transnational water companies, foreign specialized operators, PRC investment developers, privatized local water companies, and domestic operators.

Privatization has led to a sharp increase in the number of wastewater treatment plants since 2002, but a more gradual growth in water treatment and supply as well as other projects which are a combination of treatment projects and private water distribution networks. The most common model for wastewater

* This is one of a series of case studies in sustainable urban development in the PRC.

Figure 1: Organizational Structure and Funding Flows for Shanghai Zhuyuan No. 1 WWTP



Source: Zhong, et al.

projects is the Build–Operate–Transfer (BOT) model, reflected in the increase in new wastewater projects. On the other hand, water supply projects take the forms of BOT, Transfer–Operate–Transfer (TOT) and divesture models, reflecting the fact that most projects involve modifications or rehabilitation of existing facilities. Full or partial divestiture models are mainly intended to fund operational and management costs for existing treatment plants. Management and lease contracts are less commonly implemented.

Wastewater Treatment in Shanghai

The Huangpu River and Yangtze River serve as surface water sources for urban water supply to the Shanghai municipality, which has a total population exceeding 17 million. However, water pollution remains a problem given the presence of manufacturing activities including textiles, chemicals, food, and electronic products.

Wastewater and drainage services fall under the Shanghai Sewerage Company. The Shanghai municipal government plans to raise the wastewater treatment ratio to 90% by 2020, with wastewater collection and treatment covering the whole of downtown Shanghai. These steps would help ease the extent of pollution of the river systems around Shanghai. A wastewater treatment fee of CNY0.9 per cubic meter is currently built into the water tariff in Shanghai (Fu, et al.).

Structure of PPP

The Shanghai Zhuyuan Youlian No. 1 wastewater treatment project (ZY1WWTP) is the first mega-ton wastewater treatment plant (WWTP) in Shanghai, with advanced primary treatment capacity of 1.7 million m3/day. The plant is part of the Suzhou River Comprehensive Treatment Stage 1 project.

In 2002, the Youlian Consortium—formed by Youlian Development Company (45%), Huajin Information Investment Ltd. Company (40%), and Shanghai Urban Construction Group (15%)—was awarded a 20-year concession with the Shanghai Water Authority through an open tender process to provide wastewater treatment services. The consortium set a service fee of CNY0.22 per cubic meter, which was notably low. The JV also signed a service contract with the state-owned Shanghai Sewerage Company. The project was 35% funded by private capital from the consortium, with the remainder financed by bank loans. The JV was also indirectly subsidized by the local government, which invested $30 million in fixed infrastructure in the sector, while the land for the plant was provided at no cost. The organizational structure of the JV is shown in Figure 1.

ZY1WWTP is paid a service fee as agreed between the consortium and the local government. The service contract stipulates a two-tiered service fee structure paid to ZY1WWTP, depending on the volume of wastewater treated. There is a fixed service fee of CNY0.22 per cubic meter and a variable fee of CNY0.082 per cubic meter. The fee for volume in excess of

the 1.4 million cubic m^3/day is CNY0.15 per cubic meter. The variable fee may be adjusted every 3 years from the fourth year onward. Some of the conditions of the service contract include an online monitoring system and third-party monitoring of quality standards for the treated water.

Outcomes

The plant serves 23.5 million residents over an area of 107 sq km at a relatively low service fee of CNY0.22 per cubic meter of treated wastewater and a minimum treatment level of 1.4 million m^3/day. According to reports, the Zhuyuan No. 1 WWTP has been meeting its obligations under the service contract (Zhong, et al.).

The savings generated through the PPP arrangement are reflected in the service fee, which was about 40% below the government's own projected cost of CNY0.38 per cubic meter. The indirect subsidies through fixed investments and the provision of land from the government help explain how the JV was able to offer a relatively low service fee.

By aligning the service fee to performance and investments made by the JV, the government was also able to transfer the financial risks of the project from the public to the private sector.

The same consortium won a second tender in 2004 for the Zhuyuan No. 2 WWTP project, a smaller plant with a capacity of 0.5 million m^3/day for secondary biological treatment. However, one of the JV partners, Youlian Development Corporation, exited the consortium in 2005, selling its stake in the JV to a Hong Kong company, Interchina Holdings Group, for CNY150 million.

A re-tender for Zhuyuan No. 2 WWTP was called and eventually won by Shanghai Urban Construction Group (part of Shanghai Construction Group, which was a minority shareholder in the Youlian Consortium for ZY1WWTP). This second WWTP was partly financed by loans from the World Bank. This illustrates a potential risk of such PPP models, especially when the JV is made up of a number of enterprises with different expectations, expertise, and objectives.

Considerations for PPP Projects

Since PPPs have been introduced into the PRC with the economic reforms of the late 1970s, such projects have faced a number of constraints that hinder more successful and widespread implementation. Some of the key issues are outlined below.

References

J. Choi, J. Chung, and D. Lee. 2010. Risk perception analysis: Participation in China's water PPP market. *International Journal of Project Management.* 28. pp. 580–592.

T. Fu, M. Chang, and L. Zhong. 2008. *Reform of China's Urban Water Sector.* London: IWA Publishing Limited.

Y. Ke, S. Wang, and A.P.C. Chan. (No date) *Public–private partnerships in China's infrastructure development: lessons learnt.*

Z. Liu and H. Yamamoto. 2009. Public–Private Partnerships (PPP) in China: Present Conditions, T*rends and Future Challenges. Interdisciplinary Information Sciences. 15 (2).* pp. 223–230.

J. Woetzel, J. Devan,, L. Jordan, S. Negri, and D. Farrel. March 2008. *Preparing for China's Urban Billion.* McKinsey Global Institute.

L. Zhong, A.P.J. Mol, and T Fu. 2008. Public-private partnerships in China's urban water sector. *Environmental Management.* 41. pp. 863–877.

Legal and Regulatory Risks

The legal and regulatory infrastructure in the PRC for PPP activities presents a risk to private investors. For example, laws which govern PPP activities are not always consistent with one another, or government policies may be revised with little consideration for the impact on private partners.

Tariff Pricing Policies

The slow pace of deregulation of tariffs for public services could impact project profitability for the private investor.

Lack of Transparency in Bidding Process

Most PPP projects in the PRC remain hampered by a lack of transparency in the bidding and project supervision processes.

SOE Participation

State-owned enterprises (SOEs) in the PRC have been involved in several PPP infrastructure projects, creating a category of public SOE partnerships. SOEs could increasingly crowd out local private sector firms as well as foreign participation.

Access to Capital

While BOT projects and others of similar scale generally have a long-term horizon of up to a few decades, long-term financing options in the domestic financial markets in the PRC are limited.