Water in China
Key themes and developments in the water sector
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Introduction

With almost 20 percent of the world’s population but only 5 percent of the world’s renewable freshwater supplies, it is easy to appreciate why China’s government has made improving water resource management such a high priority. The Ministry of Water Resources notes on its website that out of the 663 cities in China, more than 400 are suffering from water shortages, with 110 classified as ‘severe’.

China’s move to upgrade its water infrastructure comes as it faces tremendous challenges from two directions. On one side, water quality remains an issue. On the other side, demand is projected to keep growing. For many businesses, water represents a significant risk if they find themselves caught between tightening quality controls and intense competition over supply. For others, water represents a commercial opportunity as China moves to address these twin challenges.

In this publication, we will consider how these factors are playing out and how they may affect the water business in China. We identify opportunities for investors and operators and also suggest ways that the operations of the market could be enhanced.

2 Ministry of Water Resources website (http://www.mwr.gov.cn/english/cpws.html)
China’s current water dilemma

The importance of water to China’s economy, and the need to improve the quality of water supply, is becoming more evident year-by-year. Water pollution comes from a combination of industrial users, non-point sources such as agricultural run-off, and urban wastewater (residential wastewater discharge in 2010 was 35 billion tonnes\(^4\)). Aside from rivers and lakes, China’s water pollution has an impact on the coastal areas where wastewater discharge along the eastern seaboard has resulted in dead zones in the sea.

Since the Ministry of Environmental Protection (MEP) began to monitor the water sources within China in January 2004, the quality of water available has improved. According to the MEP statistics in October 2011, 76 percent of China’s water sources are safe for drinking, compared to 53.4 percent in January 2004.

In the 11th Five-Year Plan from 2006 to 2010, China established targets related to chemical oxygen demand (COD), including development of wastewater treatment facilities in all cities by 2010, with an urban wastewater treatment rate no lower

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3. Ministry of Environmental Protection of the People’s Republic of China “全國主要流域重點斷面水質自動監測周報”

than 70 percent. Currently, there is increasing recognition of the importance of controlling nitrogen, phosphorous, and sediments as part of a strategy for improving China’s water quality. The 12th Five-Year Plan includes targets related to ammonia reduction.

In the midst of these tremendous challenges, China is facing rapidly rising demand. Almost two-thirds of the cities in China face water shortages and the size of China’s urban population will continue to grow. Demand gaps exist in China’s overall available water supply as well as distribution. The northern regions of China are heavily populated but have only a fraction of total available water resources. In addition, China’s overall amount of water resources has fallen by 12.7 percent since 2000. In these gaps lie opportunities for companies to help China meet the growing demand.

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5. China Academy for Environmental Planning “国家环境保’十一五’规划”
6. China environment “十二五”氨氮减排关键点及对策”
Major players in China’s water industry

As of 2008, the total capacity of water supply projects for the six leading foreign water service companies was only 8 percent of the total national water supply\(^\text{10}\), which highlights the scale of the opportunity and challenges for foreign players. This market situation does not appear to have materially changed over the past three years based on discussions and trends we have been seeing in advising water sector clients.

Currently, BOT and TOT contracts are common for WTPs and WWTPs, though most plants are still built on a Design and Build (DB) or an Engineering, Procurement and Construction (EPC) basis.

There are a large number of private sector participants in the market and a diverse range of companies involved in the sector or looking to enter it, including:

- Large multinationals (e.g. Suez, Veolia)
- Infrastructure funds (e.g. Challenger Financial Group and Mitsu & Co.’s Emerging Market Infrastructure Fund, Macquarie Everbright China Infrastructure Fund, Morgan Stanley Infrastructure Fund)
- Domestic investors (e.g. Beijing Capital, China Everbright International, Tianjin Capital Environmental Protection)
- Domestic operators (e.g. Golden State Environmental Group, Sound Group, Shanghai Municipal Raw Water)
- Other specialised operators (e.g. Asian Environmental Holding, Hyflux, Kardan, Ranhill).

With so many market players, bidding on tenders is very competitive for BOT plant projects among the smaller players, and for distribution network investments among the largest players.
A good illustration of this competition was the rapidly increasing premiums being offered in 2007 to secure preferred bidder status for distribution network joint ventures with municipal authorities. In 2007 alone, the premiums from successful bids by operators on several assets were often three to five times the reported net asset values of the projects. In recent years, major bids have been less common and transactions have tended to involve smaller scale projects.

On 29 December 2011, China’s National Development and Reform Commission (NDRC) released a new version of its Foreign Investment Industrial Guidance Catalogue, last revised in 2007. The new document has an effective date of 30 January 2012 and updates the status of the construction and operation of water recycling plants from the ‘permitted’ to the ‘encouraged’ list alongside the wastewater treatment services industry and the construction and operation of urban water works.

**Water Treatment Plants (WTPs)**

According to the Ministry of Housing and Urban-Rural Development (MOHURD), out of the 4,000 water treatment plants in China, the quality of the source water at less than half of them meets the national standard. The Ministry has plans to upgrade about 2,000 water plants between 2011 and 2015, as well as build an additional 2,358 water plants with a combined capacity of 40 million cubic metres per day, to meet the demands of urbanisation. This represents a major opportunity for water treatment equipment manufacturers and private developers of water plants.
Water distribution

The NDRC encourages foreign investment in the urban water treatment plant sector, hence there are no maximum shareholding restrictions in this category.

Foreign investors can invest in distribution networks in large cities by taking a minority stake (up to 49 percent) in a joint venture with the municipal utility company. The joint venture can then enter into concessions with contractors to manage the network.

In small and medium-sized cities, foreign shareholders are permitted to build and operate water supply and drainage networks, and there are no formal restrictions on ownership of water and wastewater pipe networks.

The main opportunity for investment in this area is a result of rapid urbanisation — it is estimated that from 2005 to 2020 some 400 million people will have migrated from rural areas to cities in China. Substantial investment in the expansion of distribution networks will be needed to support such a rapid pace of urbanisation.

In addition, resolution of non-revenue water (NRW) issues, where treated water is distributed but for which no payment is received, represents an important way for investors and operators to improve the operating performance of networks.

Structure of the water market

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13 Xinhua News “Thinking about China’s urbanisation at Shanghai World Expo”, 25 October 2010

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These NRW issues arise due to three key factors:

- **Leakage**: Water distribution systems in some cities are old and budgets have often constrained lifecycle expenditure. Currently over 6 billion cubic meters of water are lost as a result of leaks.  
- **Metering**: Meters are commonly inaccurate and sometimes have not been installed.  
- **Misappropriation of water**.

Investment or other initiatives to resolve these problems can result in immediate improvements to the top and bottom lines.

**Water Recycling and Wastewater Treatment Plants (WWTPs)**

Wastewater treatment continues to be a major focus in China, with investments in technologies, services and solutions set to double to more than USD 4.54 billion during China’s 12th Five-Year Plan. This has resulted in most major cities having a relatively high percentage rate of industrial wastewater meeting discharge standards (average of 94 percent). However, China’s domestic sewage rose from 22.8 billion tons to 38 billion tons between 2001 and 2010. With a daily treatment capacity of only 125 million cubic metres in urban sewage treatment plants and treatment rates at approximately 75 percent in 2010, significant further investment will be required to reach the target of 85 percent treatment rates in the next few years as urban populations expand.

Foreign investors are encouraged to invest in wastewater treatment plants in urban areas, either via wholly foreign-owned companies or by entering into joint ventures with the municipal utility company or another party. The joint venture then enters into a Build Operate Transfer (BOT) or Transfer Operate Transfer (TOT) concession contract with the municipal utility company.

Moves to make water recycling more open to foreign investment could also provide companies with the right technology additional opportunities in recycling used or waste water for potable and industrial use.

Massive investment is also required for repairing sewerage systems and flood drains, with MOHURD planning to build a total of 150,000 kilometres of water pipes to collect waste water. However, given municipal budget constraints, priority will likely be given to other environmental projects unless water distribution and WWTP systems are integrated under the same operator, in which case there may be an economic benefit from increasing WWTP throughput.
The Chinese government has recognised the importance of resolving water shortage and pollution issues for a number of years. During the opening of the 17th National Congress of the Communist Party of China (CPC) in 2007, President Hu Jintao urged for a more efficient and environmentally-friendly approach to the development, growth and consumption of water resources. This includes securing more clean drinking water, improving water conservation, preventing water pollution, restricting exploitation of excessive water resources and cutting water waste.

In January 2011, the government issued the ‘CPC Central Committee and State Council on the decision to accelerate the development of water reform’ notice (which is also called the ‘No.1 Document’, covering agricultural development) outlining investment from the central government of CNY 4 trillion over the next 10 years in water conservancy and requiring local governments to invest 10 percent of land sales revenue into rural water projects. The investment will be used in various projects, including consolidation of reservoirs and water-related infrastructure. The No.1 Document encourages participation from all market participants, including governments, private sector and farmers.

Further improvements in the quality of service to consumers will most likely be achieved via market reform, which could include the following steps:
Ensuring quality

Rationalisation of the regulatory system and clarification of roles

While the MOHURD takes overall responsibility for urban water services and the Ministry of Water Resources has overall responsibility for rural water services, many other national level ministries and commissions are involved in water management. The creation of the National Commission of Energy in 2010 to draft national energy development plans and better coordinate strategy and increase efficiency across government may act as a precedent and pilot for future reforms in the water sector.

Development of legislation to improve market transparency

The MOHURD has issued standard BOT contracts which allow for significant variation of interpretation between bidders. Enhancing the robustness of these contracts should improve the comparability between bidders and make closed deals more effective.

Making public all tenders for projects

Currently, most tenders are run on a selective basis, with the sponsor inviting a limited number of private sector companies to bid. As a result, particularly where the local authorities have limited market information, the most appropriate partner may not necessarily have an opportunity to bid. By increasing the level of competition via public announcements of the project, the municipality sponsor can improve the value it receives through more advantageous project terms.

Tightening of bidding criteria

Currently, there is often substantial variation between bid terms for a project. This implies that bidders are bidding on very different bases, or have very different views on the risks associated with the project. Enhancement of the bidding process may be achieved by ensuring bidders have comprehensive project information on which to base their bids, sufficient time to prepare strong bids and clear instructions on how to prepare their tenders, including deal structure and, where appropriate, project constraints. This should improve comparability between bidders. Bidders may be able to demonstrate innovative ideas through submitting variant bids, which could benefit not only the bidder but the project.
Extension of competitive bidding

Currently, preferred bidders are often selected early in the procurement process, based on limited information. This can lead to incomplete, weak or heavily coveted bids. By extending the period of procurement under competition, a more robust deal can be reached which will have long-term benefits for both the sponsors and the bidders.

Enhancing the incentive mechanism for officials

The requirements placed on municipalities to provide the necessary infrastructure to support the rapid GDP growth seen over the past 30 years have often meant that swift delivery of assets has taken priority over ensuring long-term value or service quality. Moreover, this need to procure quickly has been reflected in the assessment criteria for officials. Broadening the set of criteria on which officials are assessed (including consideration of procurement time, project whole-life cost, risk allocation and environmental impact) could help secure long-term stable economic growth, and ensure the most effective use of public resources.

Summary of PRC government bodies with water-related roles

<table>
<thead>
<tr>
<th>Government Body</th>
<th>Responsibilities</th>
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</thead>
<tbody>
<tr>
<td>State Council</td>
<td>Implementation of administrative orders and regulations, overall coordination of ministries and agencies</td>
</tr>
<tr>
<td>Ministry of Water Resources</td>
<td>Integrated water resources, water resource protection planning, water function zoning, monitoring water quality and quality in rivers and lakes, issues water extraction permits, proposes water pricing policies</td>
</tr>
<tr>
<td>Ministry of Environmental Protection</td>
<td>Supervisory and enforcement roles on water pollution laws, regulations, standards, water environmental function zoning, monitors water quality</td>
</tr>
<tr>
<td>National Development and Reform Commission</td>
<td>Pollution levy policy, wastewater treatment pricing policy, water pricing policy, industrial policies affecting wastewater discharge and treatment</td>
</tr>
<tr>
<td>Ministry of Finance</td>
<td>Pollution levy management, manages wastewater treatment charges, and water resource fee policy, State Office of Comprehensive Agricultural Development</td>
</tr>
<tr>
<td>Ministry of Housing, Urban, and Rural Development (formerly Ministry of Construction)</td>
<td>Urban water supply, urban wastewater treatment</td>
</tr>
<tr>
<td>Ministry of Agriculture</td>
<td>Rural and agricultural water use and agricultural pollution from agri-chemicals</td>
</tr>
<tr>
<td>Ministry of Land and Resources</td>
<td>Water as a resource, land use planning</td>
</tr>
<tr>
<td>State Forest Administration</td>
<td>Using forests to conserve water sources</td>
</tr>
<tr>
<td>Ministry of Transportation</td>
<td>Ship transportation and water pollution control</td>
</tr>
<tr>
<td>State Oceanic Administration</td>
<td>Manages sea area use, protects and conserves marine environments</td>
</tr>
<tr>
<td>National People’s Congress</td>
<td>Legislation, law enforcement, and supervision</td>
</tr>
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Organisational challenges

At the project level, a number of key changes, including those set out below, have the potential to further enhance the efficiency of the market:

**Transparency of revenue risk**

One of the biggest challenges for the private sector entering the water/wastewater market is estimating future risks to revenue growth.

Tariffs defined under standard MOHURD BOT contracts are cost-plus, comprising a cost element, adjusted regularly for CPI; inflation in specific costs, such as electricity, wages and key inputs (chemicals); and a profit element.

However, securing approval for tariff rises can be challenging. An example of this is when there is a change of the local leadership within the municipality and the new leadership requires a review of the water service provision strategy prior to authorising any increases.

The problem is exacerbated where the rate of wastewater treatment is high. As waste water fees are charged to all customers no matter the actual level of wastewater treatment, the higher the level of wastewater treatment, the smaller the amount of additional cash available to subsidise any shortfall between total tariff income and total charges paid to concession holders.

Due to the various financial and non-financial pressures on municipal utilities, bidders struggle to assess the timing and extent of actual revenue. One way to solve this might be for municipalities to guarantee the price increases. However, municipalities are currently prohibited from providing such guarantees.

Alternatively, clarity could be provided to bidders and consumers alike by legislating that tariffs be adjusted based on the affordability to the ultimate consumer rather than cost (basing tariffs), on a proportion of average GDP per head. While this appears to represent a transfer of pricing risk to the private sector, it could benefit all parties if the structure not only increases clarity over revenue risk, but also provides greater incentives to introduce more efficient operating methods and technology. For the public sector, adjusting tariffs based on affordability could help in managing the political problems caused by tariff rises, as it is fair and relatively easy to justify.
Transferring cash collection operations

Currently, cash collection from ultimate users is often performed by the municipal utility. Inefficient collection can inhibit the utility’s ability to meet its obligations under water/wastewater BOT contracts, since utilities often have little spare cash to fund any shortfall. Cash collection by the private sector (e.g. outsourcing this task) makes it relatively easy to introduce incentive structures to maximise overall collection revenue. Furthermore, if the cash collection agent is also the manager of the water distribution network or WWTP, the agent can have much greater comfort over timing and completeness over tariff income.

Vertical integration

Significant increases in efficiency can be achieved by combining the operations of WTPs, distribution and WWTPs, resulting in economies of scale and improved quality management. Vertical integration can be implemented through the consolidation of existing concessions and also by extending the scope of new concessions. These approaches are starting to be seen in certain regions across China.

Horizontal integration

Significant operational efficiency gains can also be obtained through the central operation of plants (for example allowing bulk buying of chemicals or equipment), or streamlining of staff.

Additionally, batching of projects enables reaching critical mass to access new funding sources. A potentially attractive option for the authorities would be to batch projects before going to market. This could reduce total bidding costs and attract quality operators which may not otherwise be interested in a single plant project.
Funding future developments

Introduction of domestic funds
In 2007, the scope of allowed investments for pension insurance funds was enlarged to include making deposits in large commercial banks and investing in long-term projects such as infrastructure projects. Commercial insurance companies were also recently allowed to invest in infrastructure projects. However, there have not been many reported cases of such investments.

As a result of the near-guaranteed, long-term product demand and regular cashflow, the water sector should be an ideal investment for these insurance funds. With a low cost of capital, insurance funds will potentially be able to provide both equity and debt funding to projects at market-leading rates as they will not necessarily be restricted by the current People’s Bank of China (PBOC) lending rate requirements relating to bank debt.

Foreign investors will need to adapt to this changing landscape and emphasise their non-financial value as well as financial solutions.

Energy demand risks
The most prominent issue is that China’s energy future is directly tied to its water future. First, a number of energy generation technologies require large amounts of water – including some of the ‘clean’ options, such as concentrated solar power. This means that building out China’s energy infrastructure will depend on the ability to allocate supplies of usable water to the sector. At the same time, many of the solutions to water scarcity (e.g. pumping, desalinisation, long-distance transport) also require using significant amounts of energy, intensifying the need for water.

As such, China must balance improving quantity and quality at the same time. For investors, this presents two different implications: opportunities to become involved in delivering the water solutions that China needs for some; the risks of water resource management for others. Both, though, need to ask some basic questions:

• Is there sufficient water in the region to sustain their operations? This is particularly important for investors exposed to companies in sectors such as pulp and paper or electricity generation.

• Will these companies be able to maintain access to water in the face of demand from other users? Will they be in a position to withstand the economic consequences of price increases?
• Does the company generate large amounts of wastewater or other pollutants to water sources? How well do they control these?
• Do any of the company’s critical suppliers or portions of its supply chain face risks due to water supply or water pollution even if the company does not face any challenges to its direct operations? Is the company prepared?
• How much does the company know about the water footprint of its portfolio?

The investment community is increasing its efforts in understanding these risks in terms of impact on investments by looking at a range of risks, including operational, regulatory, economic, and reputational.

**Bond market development**

A key pillar of economic reform in China is the ongoing development of an effective bond market in order to diversify the sources of funding and better allocate investment through more effective pricing of enterprise and project risk.

Although the short-term bond market is growing quickly due to the recent appetite of firms to issue commercial bonds, principally in the interbank bond market, medium- and long-term issuance is currently limited mostly to PBOC, treasury and other government-related bonds.

The development of the municipal bond market will be an important step in the development of the capital markets as a whole. Municipal bonds will be instrumental in improving overall government budgeting as bonds will increase the transparency of municipal borrowing, which currently occurs in a relatively unregulated manner through subsidiary investment companies of municipal authorities. However, although the Chinese authorities are currently looking closely at the local government bond market (e.g. the pilot local government bond issuances in the cities of Shanghai and Shenzhen, and the provinces of Guangdong and Zhejiang in November 2011), the full introduction of a municipal bond market is likely to be some time in the future, as significant matters are yet to be resolved, including legal and regulatory regimes, assessment of credit ratings and how underwriting will be performed.

When municipal bonds are broadly introduced, they should represent an important new funding source for local government entities, and will likely have a dramatic effect on how infrastructure is procured (water assets included) at a municipal level.
Sector outlook

International investors still have a window of opportunity for investing in concession type structures, particularly in BOTs that are currently operating, prior to the ramping up of domestic insurance fund investment and, further off, the implications from the introduction of municipal bond funding.

For international operators, the market is likely to remain competitive, particularly for more attractive projects. But the massive scale of investment required over the next decade and beyond for water infrastructure provides huge potential for domestic and international operators alike.

For international equipment providers, enhanced water quality requirements and increasing policy emphasis on recycling and desalination represent major opportunities to rapidly expand sales of high-technology equipment and know-how.

Consolidation between the domestic players has not yet happened on a large scale, but as in many other highly fragmented sectors, the opportunities to acquire smaller developers and operators will inevitably come, and domestic firms are arguably better placed to take advantage of these than international ones.

Sustainable growth and development are key policy themes of the 12th Five-Year Plan, and the firms (local or foreign) which align themselves best with these will be the ones that succeed.
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