



CHINA**WATER**
RISK

Investing in Water

March 2010

Investing in Water

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1. Introduction

China's water pollution and scarcity issues create considerable risks and opportunities for investors in China's water sector and for companies with significant water exposure. There is greater clarity around the Chinese water sector, because of an increase in availability of information and interest from the investment community. There is still however little transparency when it comes to assessing industrial water-related risks.

Investor interest has to a certain extent driven information, and as Melissa Brown, partner at Serasi Capital (formerly of IDFC), explained in an interview with China Water Risk (then Asia Water Project), investors have grasped the obvious opportunities in the water sector, but have not yet focused on the larger water-related risks of a nation grappling with water shortages. "China-focused investors have chosen to buy into a remarkably one-dimensional version of the investment picture," stated Brown, "by focusing on a small universe of so-called 'solution providers' with little realistic understanding of the broad-based competitive impacts of the water policy challenge." Read the full interview in OPINIONS in the section EXPERT VIEWS on the China Water Risk website. For more information on risks please download the booklet 'Water: The New Business Risk' from the China Water Risk website (www.chinawaterrisk.com).

The lack of corporate transparency has been a long-standing concern for responsible investors, who appreciate the opportunities China's growing market offers but are cautious of the landmines that come with unknown terrain. And in the absence of meaningful and well-enforced regulations to encourage reporting on environmental issues, combined with the pressure for short-term profit, when Chinese companies do disclose they often fail to cover potential material risks and do not facilitate in-depth investor analysis. For more discussion on corporate disclosure trends in China, please refer to the booklet 'Corporate Water Disclosure' which can be downloaded from the China Water Risk website.

For industrial water-intensive users, business risks can translate into risks to earnings from events such as unforeseen compensation payments following pollution incidents, increased cash flow volatility (such as when a plant suspends production from lack of water) and 'soft' payments to local officials to approve plant construction or increased costs of water treatment from upstream discharges.

We draw attention to the well-publicised case of Fountainset, and as recently as January 2010, the Chinese government fined a Zhejiang-based pharmaceutical company RMB 2.2 million (USD 322,200) for dumping more than 1,000 barrels of unprocessed, noxious waste in neighboring Anhui province in December 2009. According to a China Daily report¹, the chemical waste contains dichloromethane, methanol and methane, which are categorized as hazardous waste chemicals under national regulations in China.

Acknowledging the complexity of China's political landscape, an evolving regulatory framework, increasing water tariffs, and the growing number of public protests triggered by water pollution, experts advise that the only way for investors to navigate China's rough waters is to actively engage companies in dialogue.

¹ China Daily, "Drug Firm Made To Pay For Pollution," January 13, 2010

2. China's Water Sector

2.1 Investing Trends

The following sub-section was developed in collaboration with the Association for Social and Responsible Investing in Asia (ASrIA).

Interest in China's water sector has been growing for over a decade. Initially, this was a reflection of the same process that brought global players into the Chinese power sector and new investment flows into Chinese infrastructure assets. But in past years, new levels of interest have been spurred by thematic investors pursuing both infrastructure and water-linked assets and a surge in business opportunities for local players. A critical driver for this process has been the implementation of the Water Resource Law in 2002, which established new oversight and management structures that facilitated the move to a user-pay system. Refer to 'REGULATIONS' on the China Water Risk website (www.chinawaterrisk.org) for further information on the latest regulatory trends.

Investor confidence has also grown with the increasing sophistication of China's debt and equity markets. Credit constraints previously hindered the ability of both local and foreign water companies to rely on China's banks and financial markets. We now see Suez and Veolia, the two most dominant foreign water utilities in China, financing the bulk of their recent investments from Chinese banks.

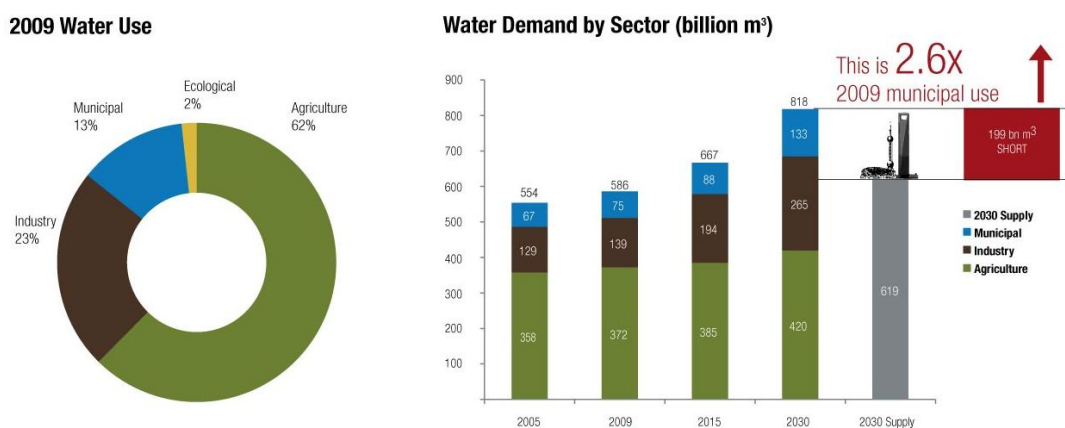
These foreign utility companies, along with Thames Water, have been the dominant multinational players in China's water market. Their business model has been based on public-private partnerships (PPP), preferring so-called Build-Operate-Transfer (BOT), also known as Build-Own-Operate-Transfer (BOOT), over riskier full concession contracts.

Under a BOT arrangement, the company invests the full costs required in the construction of the reservoir or treatment plant and is contracted to operate the facility for a defined period (usually 15-30 years), after which it is transferred to the public sector. The local water authority pays the company a set price per cubic metre of water for the duration of the contract. In ensuring that the company is able to recoup the costs of this investment, the set price must provide sufficient revenue for the company to cover its capital costs and operations while equally remaining affordable to the government over the long-term. This latter challenge has been the source of broken contracts in the past. In 2004, Thames Water abandoned its Da Chang plant in Shanghai, the first BOT arrangement in China, following the municipal government's re-negotiation of the guaranteed rate of return.

In addition to water demand growth and supply shortages, wastewater is the second dynamic bet for investors in China's water market. According to a 2009 World Bank report², investment shortfalls have contributed to the failure to meet pollution control targets—such as reducing COD discharges by 10 % by the end of 2005. Without sufficient capital, “wastewater treatment capacity, including sewerage networks, has not expanded adequately, especially in small cities and townships. As a result, only 56 % of the 53.7 billion tonnes of domestic wastewater discharged is treated in some form.”

² World Bank, “Addressing China's Water Scarcity: Recommendations for Selected Water Resource Management Issues,” 2009

Figure 1: Water Use in 2009 and Water Demand by Sector



Source: National Bureau of Statistics of China, China Statistical Yearbook 2010; 2030 Water Resources Group, "Charting Our Water Future", 2009

2.2 Water Trading

The following sub-section was developed in collaboration with the Association for Social and Responsible Investing in Asia (ASrIA). Content was based on their report, "Investing in Asia's Water Sector".

While China's water sector has much less experience with privatization than other regional markets, it has witnessed the greatest level of global investor interest driven by heightened water scarcity and the government's cautious application of market principles to water pricing. These two conditions are a prerequisite for the development of a water trading market. Under such a trading system, the purchase and sale of water rights is based on different users' assigned value to the resource. Rather than price the resource according to government regulation, free market principles based on supply and demand dictate an equilibrium price like that of other commodities. For example, agriculture users may find it more economical to sell a portion of their water rights to other users and invest in less water intensive crops or efficient irrigation technologies.

The first clear sign of a possible move in this direction is China's massive water transfer from the country's water-rich South to the relatively arid North. This is in essence a one-way trading scheme at the most macro level that attempts to bring demand and supply into balance. The project diverts water to productive areas in the North that assign a much higher value to the resource's use than those in the South (Figure 2). The fact that this project has become a reality, having been discussed for 50 years, further speaks to the excessive cost of accessing new water resources in the North.

Of course, there are a number of key fundamentals that must be in place for a water trading scheme to work and China faces challenges in this area. Not in the least, it requires assigning water rights that can be priced free of government intervention. Water trading also requires a high degree of information related to resource availability and knowledge of sellers with buyers willing to trade. Lastly, it is dependent on market oversight, which is complicated in China's case where authority is defined in different ways according to municipal, provincial and national levels.

Figure 2: China's South to North Water Diversion Project



2.3 Investing in Water Intensive Users

Water-related risks have received increasing interest from the investment community, as evidenced by a growing volume of investment research.

- In 2006, in its *Thirsty China* report, CLSA highlighted water as the biggest resource constraint to China's growth and advised investors to question the management of companies in water-exposed industries about their compliance with water pollution regulations.
- In 2008, JP Morgan released its report, *Watching Water*, which offered a framework for evaluating water scarcity and water pollution, and predicted that companies will come under increasing pressure to disclose water-related risks to investors (see Box 1).
- In 2009, investor-focused CERES, in its *Water Scarcity and Climate Change: Growing Risks for Business and Investors*, stated that investors have a significant interest and role in catalysing companies to screen for potential risk exposure to water-related challenges. The report also maps the water use and discharges of water exposed industries.

Leading global financial institutions, particularly those with a Socially Responsible remit, have also begun screening for water-related risks. In December 2008, an alliance of investors with a combined portfolio worth US \$1.5 trillion and signatories to the UN-backed Principles for Responsible Investment (www.unpri.org), urged 100 of the world's biggest companies to join the CEO Water Mandate³, a Global Compact initiative designed to assist companies in the development, implementation and disclosure of water management policies and practices. That same year, following the launch of its Global Water Fund, SRI giant Calvert emphasized specific water issues in the Fund's advocacy agenda to include equitable and affordable access to water and sanitation as well as the relationship between climate and water risk. The firm reports that it is successfully influencing some companies to produce sustainability reports.

³ www.unglobalcompact.org/Issues/Environment/CEO_Water_Mandate/

In 2009, Norges Bank Investment Management, which manages the Norwegian Government Pension Fund, one of the world's biggest funds with a US \$407 billion portfolio, added water management to its corporate governance investment criteria. APG, the Dutch pension fund, also amongst the world's largest, now considers water risks in its investment analysis. Experts have predicted that this will only strengthen the trend in recognising water-related investment risks as a cost issue rather than just an environmental factor⁴.

Also in 2009, the Carbon Disclosure Project (CDP), known for its investor-driven carbon reporting initiative, launched its Water Disclosure Project (WDP), a new programme designed to help institutional investors to understand the financial risks that water-related issues pose to their investment portfolio. Similar to the Carbon Disclosure Project, WDP⁵ will provide a framework for companies to report their use of water and their exposure to changing patterns of water availability. Measurement and reporting of water availability and usage itself can be even more complex than for carbon.

Following the trends observed in the CDP, predictably much of the information, in the short-term, will most likely come from foreign-owned multinational companies, with scant disclosure from Chinese-owned companies (refer to the booklet "Corporate Water Disclosure" on the China Water Risk website for more details").

Box 1: Water-related Risks

Despite the variability and complexity of water-related risks, JP Morgan illustrates how these risks can affect corporate financial performance:

1. **Financial losses in the form of foregone revenue due to disruption of the production process.**
2. **Higher costs related to:**
 1. supply chain disruption;
 2. changes in production processes;
 3. capital expenditures to secure, save, recycle or treat water;
 4. regulatory compliance; and
 5. the increased price of consuming or discharging water. In emerging economies, even where a particular company is not a heavy user of freshwater or discharger of polluted water, it may have to absorb the costs associated with improved local water-quality standards driven by higher incomes and increased environmental consciousness.
3. **Delayed or suppressed growth due to intensifying competition for water.**

⁴ Financial Times, "Water Splashes onto Pension Agenda," September 21, 2009

⁵ www.cdproject.net/water-disclosure

2.4 Investing Along the Value Chain

The following sub-section is based on Nomura's *Water: Turning Hot Again!*, February 2009.

The full report can be found in the RESOURCES section of the China Water Risk website (www.chinawaterrisk.org).

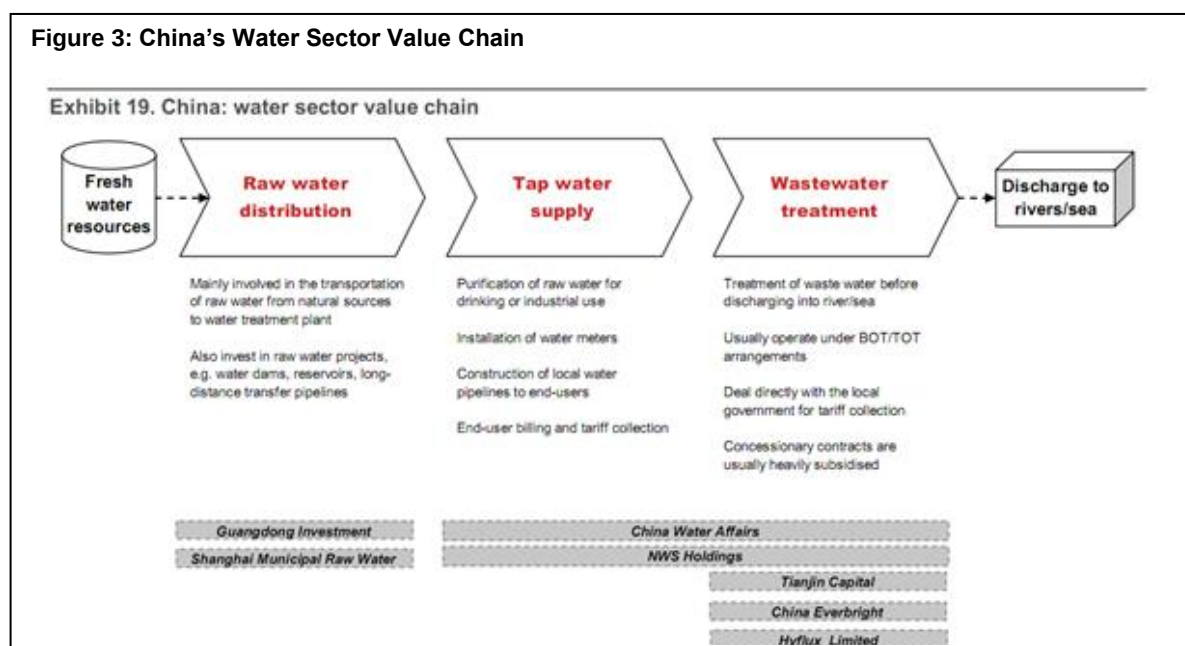
The typical water supply value chain in China can be broken down into three major stages: (i) raw water distribution; (ii) tap water supply; and (iii) wastewater treatment. Opportunities for partnerships inevitably vary depending on which market the investor is in and the size of the city in which the project is located.

Upstream raw water distribution mainly involves the transportation of raw water from natural water sources to downstream water treatment plants, and in some cases, water exploitation and preservation projects (e.g. reservoir construction).

Tap water operators treat raw water and supply it to end users through their pipeline network. As stipulated by the regulations, the water supplier is also responsible for installing water meters to measure water usage and correctly bill and collect integrated tariff from its customers.

Finally, the sewage produced by end users is collected through a sewage network and is treated before it is released into the sea/river.

Figure 3: China's Water Sector Value Chain



Source: Nomura International (Hong Kong) Limited

Tap Water Supply

Building on the political reforms in the water industry that began in 2000, central government policies encourage local authorities to privatise/commercialise water utilities. Tap water supply plants in China are still fairly distressed and operating at poor returns (4.1% net margin and 0.8% ROA in 2007) due to their previous status as public welfare enterprises. But with local governments under pressure to improve water quality, as the bar is set higher at the national level, reasonable investment returns are being offered to foreign and domestic investors to take over distressed operations and turn around operations and profitability.

Unlike wastewater treatment, water supply infrastructure is more developed and has grown steadily at 3%, in line with urbanisation and population growth. The tap water supply segment has certain advantages over wastewater treatment, since the latter's standalone operations receive fixed and highly subsidised tariffs from the government as its single debtor. Water supply tariffs are generally passed onto and directly collected from end users; therefore, fewer regulatory and collection risks are involved with the local government. Also, tap water supply plants are involved in pipeline expansion and meter installation, which provide more flexibility and components to realign profitability.

Wastewater Treatment

Owing to rapid growth in industrial activities and urbanisation, about 50% of the country's wastewater is currently released into rivers and the sea without any treatment, according to the Ministry of Water Resources. Shanghai, for example, is surrounded by rivers but still has one of the lowest water resources per capita in the country, partly due to its large population growth and water pollution in upstream areas.

China's wastewater treatment has to reach 121 million m³ by 2010F (a 19% CAGR) to meet the government's target sewage treatment ratio of 70%. However, only 100 million m³ is included in the government's original plan, indicating more favourable policies are required to meet this target. Not surprisingly, experts have predicted significant growth potential in the near term (According to Global Water Intelligence⁶, China's wastewater sector anticipates 3,000-4,000 new wastewater plants in the next five years) given:

- severe under-investment and under-penetration;
- environmental pollution; and
- sewage pipeline networks not being fully set up in many cities.

However, despite positive signals from government, experts remain cautious on whether long-term earning and margins of BOT and TOT projects can be sustained, given higher regulatory risks of reliance on local government contracts.

⁶ Global Water Intelligence, "Explaining China's wastewater boom," September 2009

Table 1: Wastewater Treatment Output Quality Classification
Quality Breakdown of Treated Wastewater

(mg/L)	IA	IB	II	III
COD	50	60	100	120
BOD	10	20	30	60
SS	10	20	30	50
Fat	1	3	5	20
Petroleum	1	3	5	15
Anionic Surfactant	0.5	1	2	5
Nitrogen	15	20	-	-
Ammonian - temperature above 12°C (at or below 12°C)	5(8)	8(15)	25(30)	-
Phosphorus - on and before 31 Dec 2005	1	1.5	3	5
Phosphorus - from 1 Jan 2006	0.5	1	3	5
Chroma	30	30	40	50
PH	6-9	na	na	na
Coli group (unit/L)	10 ³	10 ⁴	10 ⁴	-

Source: Nomura, "Water/China: Turning Hot Again!," February 2009:
Treated water output from wastewater treatment plants is generally classified as grade 1A, 1B, and 2, etc., within which there are multiple sub-categories depending on the concentration of COD and other micro-organisms.

2.5 Public-Private Partnership Options in China's Water Sector

Opportunities for partnership with water supply and wastewater service providers depend to a large degree on the operation's location. According to KPMG⁷:

1. Foreign ownership in the urban water treatment market is quite liberal, as there are no maximum shareholding restrictions in this category.
2. For the water distribution market, foreign ownership restrictions depend on the size of the city:
 - foreign investors in large cities can invest in distribution networks by securing a minority position (up to 49%) in a joint venture (JV) with a municipal utility company; and
 - in small and medium-sized cities, foreign shareholders are given more operational control. They are allowed, for example, to build and operate water supply and drainage networks. In addition, there are no formal restrictions on ownership of water and wastewater pipe networks.
3. For the wastewater treatment market, foreigners are able to invest in wholly-owned companies and to partner with a local Chinese partner in a joint venture.

⁷ The Water Business in China: Looking beneath the surface , KPMG, 2009.

2.6 Players in the Water Sector

The following sub-section was developed in collaboration with Responsible Research and the Association for Social and Responsible Investing in Asia (ASrIA). Content was based on their published research of China water issues.

Global water companies (Box 2), such as Veolia and Suez, have been active in the Asia market for 20 to 30 years and have in many ways defined the terms by which private companies can operate in China's market. Yet nipping at their heels today are local Chinese companies, whose aggressiveness is illustrative of the level of risk they are willing to take. Risk in the water sector is defined by how low a company is willing to bid a contract in terms of negotiated bulk water sale price as well as the number of total years required to recoup the capital investment. Aside from price wars, there are also Chinese companies' political connections and the relaxed enforcement of Intellectual Property rights in China that are disadvantageous to foreign players.

While market capitalization places these small-cap Chinese companies at a different scale compared to the multinational operators, stiff competition from Chinese entrants has contributed to falling margins for the dominant players. And with more funds becoming readily available through local banks and increased government budgets, these companies hope to be well placed to win contracts. For example, Chinese-listed Tri Tech announced, in January 2010, BTO contracts to upgrade two existing wastewater treatment plants.

Box 2: Global Water Companies

- Veolia (www.veoliawater.com)
- Suez Environment (www.suez-environnement.com)
- General Electric Water (www.gewater.com)
- Siemens AG (www.siemens.com)
- ITT Corporation (www.itt.com)
- Kurita Water Industries (www.kurita.co.jp)
- Nalco Holding Co (www.nalco.com)
- SAUR (www.saur.com)
- Sino-French Water Development Co (www.sinofrench.com)

A list of major foreign and Chinese invested water projects from 1992-2011 is provided in Appendix I.

Increased Government Spending on Water

The following sub-section was developed in collaboration with Responsible Research and the Association for Social and Responsible Investing in Asia (ASrIA). Content was based on their published research of China water issues.

China budgeted RMB 473billion (RMB 330 billion for wastewater treatment; RMB 143 billion for water supply) in the 11th Five-Year Plan (2006-10F) for the water industry, which was subsequently raised by RMB 33 billion in January 2008 by the Ministry of Construction. This has jump-started investment into water utilities, including the expansion, upgrade and replacement of water plants and pipelines.

Experts are predicting that this currently fragmented market will take a few more years to consolidate, similar to the power sector, as more local companies enter the industry.

In its 2010 investor report ‘China Water – Issues for Responsible Investors’, Responsible Research, assessed the Environmental, Social and Governance (ESG) activities and disclosure of both global and Chinese water companies (refer to the appendix for a summary table), operating in China. Chinese companies are predictably behind in ESG reporting— less than one in 10 companies have any reporting whatsoever and those that do, report in a very limited fashion. The two exceptions seem to be Zhongshan Public Utilities Group Co. Ltd., and Nanhai Development Co Ltd. While it seems logical for such an environmentally-sensitive sector to be actively reporting on ESG issues, US-based Interfaith Centre on Corporate Responsibility (ICCR) reveals in a study⁸ that most investor-owned water utilities globally have a long way to go in order to provide adequate ESG disclosure to investors. For a more in-depth discussion on corporate disclosure in China, please refer the booklet “Corporate Water Disclosure” on the China Water Risk website (www.chinawaterrisk.org) for more details.

3. Water Funds

3.1 Types of Funds

Water funds tend to be differentiated by their management styles: (i) either active or passive, (ii) according to whether ESG (environmental, social and governance) screens are employed, and (iii) by the selection and weighting of companies in the portfolio. Not all water funds marketed as Clean Tech or Green investments apply ESG screens, and some label water funds as “intrinsically sustainable,” which is a questionable assumption.

When it comes to selection and weighting of companies within the portfolio, some funds include a mix of companies from different segments of the industry and a variable percentage of revenue derived from water services. Other funds include conglomerates, such as GE, which derive only a portion of their revenues from water. Typically funds that hold conglomerates have only 50% exposure in their portfolio to the water sector⁹. Other investment vehicles choose to spread investments across a basket of small “potential takeout candidates”¹⁰. Companies engaged in bulk water transfers, or the right to acquire water from source and transport at a profit, tend to have a higher ESG risk profile than other water service utilities.

Many water funds, such as Sarasin Sustainable Water Fund and CLSA Capital Partners Clean Water Asia Fund, prefer technology and solution-oriented firms to utilities, for example favouring companies making water meters and sanitary equipment such as Swiss-based Geberit and Itron Inc. Singapore-based diversified water treatment company Hyflux Ltd., is a major player, with operations in India and China and completed projects in North Africa and the Middle East, specializing in desalination, water recycling and filtration.

⁸ Liquid Assets, Interfaith Centre on Corporate Responsibility, 2009

⁹ President, Sextant Capital Management, “Liquid Assets,” ICCR The Corporate Examiner, 2009

¹⁰ Goldman Sachs, Ambrose Evans Pritchard, “Money,” *Daily Telegraph*, 2008/06/05

Of funds that do invest in utilities, from research it seems that some prefer to acquire majority stakes in existing projects in the operating phase on a transfer-operate-transfer (TOT) basis, which presents a more ready cash flow and will not take on the construction risk of build-operate-transfer (BOT) projects. Although the Chinese government encourages international investment, the complexity around public-private partnerships means navigating the Chinese water bureaucracy is not for the faint-hearted.

The following list is a sample of for-profit Asian domiciled water, global water, and water exchange traded funds. It is provided for informational purposes only and does not constitute an offer to sell or the solicitation of an offer to purchase any security, product or service, nor is it intended to be exhaustive.

Examples of Asian Domiciled Water Funds

Hong Kong

- Amundi Funds Aqua Global
- Allianz RCM Global Trends Fund
- KBC Water Fund

Japan

- Nomura Aqua Investment (with hedge)
- Nomura Aqua Investment (without hedge)

Korea

- Hanwha Global Water Fund
- KDB S&P Global Water Equity Fund
- Samsung Global Water Fund
- KITMC Korea World-wide Water Equity Fund

Alternative Investments

- AmKonzen Asia Water Fund
- CLSA Clean Water Asia Fund
- CLSA Clean Water Asia Long Only Fund
- Lyxor Dynamic Water Fund

Examples of Water Exchange Traded Funds (ETFs)

ETFs are a basket of securities that are based on an index. They are traded on exchanges like stocks. More information on water-related ETFs can be found on the website: www.etftrends.com/tag/water.

- Claymore S&P Global Water Index ETF (CGW)
- First Trust ISE Water (FIW)
- Global Water Portfolio ETF (PIO)
- PowerShares Water Resources Fund (PHO)
- Janney Global Water Indexes (JGI)

Global Water Funds

- Lyxor Enhanced Global Water fund
- Pictet Funds Water fund
- Sustainable Asset Management Sustainable Water fund
- KBC Eco-Water fund
- Swisscanto Equity Water fund
- Sarasin & Partners Sustainable Water fund
- Lyxor ETF World Water
- S&P Global Water Index
- Calvert Global Water Fund

4. Assessing Risks in Your Portfolio

The following questions are an excerpt from Responsible Research's 2010 report, "Water in China: Issues for Responsible Investors." The United Nations Environment Programme's Financial Initiative (UNEP FI) also provides a relatively detailed checklist for financial practitioners in the report "Half Full or Half Empty", as a basis for identification, assessment and mitigation of water-related risks.

Questions such as these should not be part of a pro forma "Box Ticking" exercise. Rather, they highlight initial issues that can promote a dialogue between company management and shareholders. The questions are by no means intended to be exhaustive and are provided here as guidance only. For more information on the business risks related to water, please download the booklet "Water: The New Business Risk" from the China Water Risk website (www.chinawaterrisk.org).

Water Foot Printing	Does the company measure and understand its water footprint?
	Does the company know its direct water use?
	Does the company measure how much water is required and used in its direct operations?
	Does the company measure the quantity and quality of its wastewater discharges?
	Does the company understand the connections between its energy and water use?
	Does the company monitor its indirect water use?
	Does the company know which parts of its supply chain are most water-intensive?
	Is the company aware of how much water is used or discharged in association with its products and services?

Water Risk Assessment	Has the company assessed the business risks associated with its water footprint?
	Has the company evaluated water risks associated with its direct operations?
	How are the company's direct operations dependent on quantity, quality, timing and cost of water supply?
	What is the nature of the company's water rights and legal obligations with regard to quantity, quality, price, reliability and duration of water supply?
	What percentage of the company's direct operations is located in water-stressed or ecologically sensitive regions? Is water demand growing in those regions?
	What percentage of the company's direct operations relies on energy sources that require large amounts of water to produce?
	What percentage of the company's direct operations is located in the areas where local population lacks access to clean and affordable drinking water and sanitation?
	What is the water infrastructure situation and water management capacity in regions with key operations?
	How does the amount and source of the company's water withdrawals impact local communities and ecosystems?
	How does the quantity and quality of wastewater discharge impact local communities and ecosystems?
Water Risk Assessment	What is the quantity/quality of the company's wastewater discharges in relation to permitted levels and/or industry averages?
	Has the company considered water risks related to its extended supply chain?
	How might the company's supply chain be affected by changes in water supply, quality, reliability, and price?
	What percentage of the company's supply chain is located in water-stressed or ecologically sensitive regions?
	Has the company considered water-related regulatory risks of key suppliers?
	What percentage of the company's key suppliers relies on energy sources that require large amounts of water to produce?
	Has the company considered water risks related to its products and services?
	How are the company's products and services dependent on quantity, quality, reliability and the price of water supply? How do they perform in relation to competitors?
	What percentage of the company's product users and customers is located in water-stressed or ecologically sensitive regions? Are those customers and users located in regions with growing water demand?
	Do the company's services and products have potential impacts on water resources when disposed of or recycled?
Water Risk Assessment	How will water supply, quality, and reliability in the company's key markets be potentially affected by climate change?
	What percentage of the company's direct operations and supply chain are located in areas where the local population lacks access to clean and affordable drinking water and sanitation?
	Has the company considered water-related regulatory risks of its products and services?
	Does the company have contingency plans to respond to water risks, such as supply disruptions, price increases, more stringent regulations etc?
	Does the company conduct contingency planning for regions with key operations?
	Does the company have contingency plans to respond to supply chain disruptions or raw material price increases due to water issues?
	Has the company assessed how climate change will affect water availability, reliability, price and quality?
	How might the company's direct operations be affected by changes in water supply quantity, quality, and reliability due to climate change?
	Does the company assess how its raw material supply and supply chain may be affected by change in water supply quantity, quality and reliability due to climate change?
	Does the company assess how users of its products and services may be affected by change in water supply quantity, quality and reliability due to climate change?
Water Risk Assessment	How might water price, permits and water quality regulation be affected by climate change in key places the company operates?

Water and Business Strategy	Has the company integrated water risk into its overall business planning and governance structure?
	Does the company have a water management policy and plan?
	Has the company's top management (i.e. CEO and board) publicly expressed its commitment to sustainable water management?
	Has the company made water management the responsibility of a direct report to the CEO and ensured that a board-level committee has water management as part of its mandate?
	Has the company formed an integrated water-energy team staffed by a representative of every business function that uses significant amounts of water or energy, or has the potential to pollute water?
	Has the company developed water management programs with specific priorities, tasks, measures and quantified performance goals based on the company's water, energy, and carbon footprints and impact assessments?
	Does the company have a system that promotes continuous improvement in water management and performance?
Water and Business Strategy	Does the company meet or exceed regulatory requirements for water use and quality?
	Does the company meet or exceed regulatory requirements in its direct operations?
	Does the company work with suppliers to make sure that they meet or exceed regulatory requirements for water use and quality?
	Does the company's water management planning integrate the impacts of climate change on water resources?
	Does the company consider impacts of climate change on water for siting plants or investment decisions?
	Does the company consider the energy implications of water management plans and activities?
	Does the company develop or invest in business opportunities that address water issues?
Water Disclosure Policy and Practice	Does the company develop and provide solutions to water scarcity and quality, such as water efficiency or treatment technologies, water-efficient products, etc.?
	Does the company apply best available technologies to improve water efficiency or wastewater quality?
	Does the company consider energy implications of measures and solutions to water issues?
	Does the company disclose and communicate its water performance and associated risks?
	Does the company report and communicate its water policies and management plans?
	Does the company report its water performance, using broadly accepted metrics or indicators, such as those provided by the Global Reporting Initiative?
	Does the company report its water use/discharges for direct operations?
Stakeholder Engagement	Does the company report water use/discharges at the regional or facility levels?
	Does the company report water use/discharges for key suppliers?
	Does the company disclose water-related risks in its stock exchange filings?
	Does the company engage with key stakeholders (e.g., local communities, non-governmental organisations, government bodies, suppliers, employees) as a part of its water risk assessment, management, and long-term planning?
	Does the company consult with local communities and non-governmental organisations regarding water impacts as it considers where and how to site or expand its operations?
	Does the company work with local governments, businesses and communities to develop and implement integrated watershed management in locations with key operations?
	Does the company collaborate with governments and communities to address issues related to access to drinking water and sanitation?



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Appendices

APPENDIX I

Major Foreign-Invested PPP Water Projects (1992- 2011)

Major Public Private Partnership Projects in China 1992/2011 from Foreign Companies					
Location	Awarded company	Year	Project	Duration in years	Population served
Zunyi	Hyflux	2011	BOT of Waste Water Treatment Plant	30	800,000
Chongqing, Yueli	Sino-French	2009	Water Management and Distribution	40	1.2 million
Suzhou	Sino-French	2009	Waste Water Treatment	30	610,000
Tianjin	Sino-French	2009	Renovation and Operation of a Drinking Water Facility	30	1.5 million
Zhumadian	Sembcorp	2008	Water Management and Distribution	30	400 000
Yancheng	Sembcorp	2008	Water Management and Distribution	30	716 000
Nanan, Fujian	Salcon	2008	Water Management and Distribution	30	1 million
Wuhan, Huangpi	Asia Water Technology	2008	BOT of Water Treatment Plant	30	1,1 million
Huangshi, Kaidi	Asia Water Technology	2008	BOT of Waste Water Treatment Plant	27	1 million
Tianjin	Veolia	2007	Water Management and Distribution	30	3 million
Haikou	Veolia	2007	Water and Waste Water Management and Distribution	30	800000
Lanzhou	Veolia	2007	Water Management and Distribution	30	3.2 million
Changshu	Sino-French	2006	Water Management and Distribution	30	1.8 million
Liuzhou	Veolia	2006	Water Management and Distribution	30	1 million
Bengbu	FCC	2005	BOT of Waste Water Treatment Plant	25	2 million
Changzhou	Veolia	2005	Water Management and Distribution	30	1.2 million
Kunming	Veolia	2005	Water Management and Distribution	30	2.5 millions
Handan	Veolia	2005	BOT of Waste Water Treatment Plant	25	800,000
Urumqi	Veolia	2005	Renovation and operation of a waste water facility	23	1.14 million
Hohhot	Veolia	2004	Renovation and Operation of a Drinking Water Facility	30	1 million
Sanya	Sino-French	2004	Water Management and Distribution	30	280 000
Shenzhen	Veolia-Beijing Capital Co	2004	Water and Waste Water Management and Distribution	50	7.61 million
Beijing Baoji	Veolia-Beijing Capital Co	2003	Water Management and Distribution	25	500,000
Qingdao	Veolia	2003	BOT of Waste Water Treatment Plant	25	820,000
Chongqing	Sino-French	2002	Water management and distribution	50	1 million
Qingdao	Sino-French	2002	Water Management and Distribution	25	2.5 million
Shanghai-Pudong	Veolia	2002	Water Management and Distribution	50	2.22 million
Zhuhai	Veolia	2002	BOT of Waste Water Treatment Plant	30	330,000
Shanghai	Shanghai Fengshian Saur	2001	Concession for Drinking Water	28	700,000
Zhengzhou	Sino-French	2001	Water Management and Distribution	30	na
Chengdu	Veolia	1998	BOT of Water Treatment Plant	18	2.66 million
Tianjin	Veolia	1997	Renovation and Operation of a Drinking Water Facility	20	1.85 million
Shengyang	Hong-Kong Huijin	1996	BOT of Water Treatment Plant	20	na
Harbin	Shanghai Fengshian Saur	1996	BOT and OM of Waste Water Treatment Plant	28	2.8 million
Shanghai	Thames	1995/2002*	BOT of Water Treatment Plant	20	2 million
Zhongshan	Sino-French	1992	Water Management and Distribution	35	170,000

Source: Pinset Masons Water Yearbook 2010-2011

APPENDIX II

Major Chinese-Invested PPP Water Projects (1992-2011)

Major Public Private Partnership Projects in China 1992/2011 from Local Companies					
Location	Awarded company	Year	Project	Duration in years	Population served
Chongqing	Chongqing Water Group	2010	Water Management and Distribution	na	12.5 million
Wuzhou, Guanxi	China Water Affairs	2010	Water Management and Distribution	na	1.5 million
Shenzhen	Beijing Entreprises Water Group	2010	Waste Water Treatment	20	2 million
Jilin, Shandong	Zhongshan Public Utilities	2009	Water Management and Distribution	na	2 million
Xian	Tianjin Capital Environment Protection	2008	Waste Water Collection and Treatment	25	1 million
Jiangyin	China Everbright	2008	Waste Water Treatment	30	1 million
Jinan	China Everbright	2008	Waste Water Treatment	30	2 million
Taiyuan	Beijing Capital Co	2008	BOT of Waste Water Treatment Plant	na	800 000
Shenzhen	China Water Industry Group	2008	Water Management and Distribution	na	1 million
Wuhan, Huangpi	Asia Water Technology	2008	BOT of Water Treatment Plant	30	1,1 million
Lishui	Qianshan Water Ressources	2008	Water Management and Distribution	na	1 million
Huangshi, Kaidi	Asia Water Technology	2008	BOT of Waste Water Treatment Plant	27	1 million
Xiamen	General Water of China	2006	Water and Waste Water Management and Distribution	30	2 million
Suzhou	Biotreat Technologies	2006	BOT of Waste Water Treatment Plant	25	2 million
Hangzhou	Tianjin Capital Environment Protection	2005	Waste Water Collection and Treatment	26	2 million
Xianjian	Biotreat Technologies	2004	BOT of Waste Water Treatment Plant	25	1 million
Changsha, Hunan	Beijing Entreprises Water Group	2004	Waste Water Collection and Treatment	20	900,000
Wuhan, Anxi	Asia Water Technology	2004	BOT of Waste Water Treatment Plant		1 million
Shenzhen	Veolia-Beijing Capital	2004	Water and Waste Water Management and Distribution	50	7.61 million
Xuzhou	Beijing Capital Co	2004	Water Management and Distribution	30	1.2 million
Shenzhen	Beijing Entreprises Water Group	2003	Waste Water Treatment	25	1 million
Maanshan	Beijing Capital Co	2002	Water Management and Distribution	30	550,000
Tianjin	Tianjin Capital Environment protection	2001	Waste Water Collection and Treatment	26	7.5 million

Source: Pinset Masons Water Yearbook 2010 - 2011

APPENDIX III

Chinese and International Water Companies

Key International Water Companies in the China Market				
Company	Bloomberg Ticker	Technology Strength	Operation and Management in China	Operation Type
GE Water	GE:US	Membrane technologies and reuse, cooling and chemical management	Design and build player in China	No assets acquisition
ITT Corporation	ITT:US	Pumps, valves and fluid management	Design and build player in China	No assets acquisition
Kurita Water Industries	6370:JP	Ultra Pure Water and chemical management	Design and build player in China and chemical Management	No assets acquisition
Nalco Holding Co	NLC:US	Chemical supplier and management solution	Chemical management	No assets acquisition
SAUR	Private French Co.	Operations and Management specialist with a Design and build division	Almost 3.5 million inhabitants served	JV with local water companies. Bid to acquire the assets
Siemens AG (DE)	SIE:GR	Reverse Osmosis, Ultra Violet lights, Membranes Bio Reactors and reuse technologies	Design and build player in China No assets acquisition	No assets acquisition
Sino-French Water Development Co (Suez Environment & NWS Holdings (659:HK) JV)	Not Listed	Degremont specialized engineering sister company	Almost 21 million inhabitants served	JV with local water companies. Bid to acquire the assets
Suez Environment Co	SEV:FP	Degremont specialized engineering sister company	Design and build player in China	No assets acquisition
Veolia Environment SA	VIE:FP	Veolia Water System specialized engineering sister company	Almost 22 million inhabitants served	JV with local water companies. Bid to acquire the assets

Key Asian Water Companies in the China Market				
Company	Bloomberg Ticker	Technology Strength	Operation and Management in China	Operation Type
Asia Environment Holdings Ltd	AEN:SP	Design and build; Operation and Maintenance	Almost 4 million inhabitants served	EPC and JV with local companies for BOT
Cathay International Water	CTI:LN	No public information available	Almost 4 million inhabitants served	EPC and JV with local companies for BOT
Guangdong Investment Ltd	270:HK	Utilities and construction conglomerate	Almost 6 million inhabitants served	JV with local companies for BOT and OM
Hong Kong & China Gas and Light	3:HK	Utilities conglomerate	Almost 2 million inhabitants served	JV with local companies for BOT and OM
Hyflux Ltd	HYF:SP	Membrane technologies and desalination	Almost 2 million inhabitants served	EPC and JV with local companies for BOT
Kerry Utilities	PEP:MK	Conglomerate	Almost 1 million inhabitants served	EPC and JV with local companies for BOT
PBA Holdings Bhd	PBAH:MK	Design and build; Operation and Maintenance	Almost 2,25 million inhabitants served	EPC and JV with local companies for BOT
Salcon Bhd	SALC:MK	Design and build; Operation and Maintenance	More than 2.6 million inhabitants served	EPC and JV with local companies for BOT
Sembcorp Industries	SC:SP	Multi-utilities specialist	Almost 4.4 million inhabitants served	Establishing JV with industrial park to operate centralized WWTP (2 in Jiangsu, 1 in Liaoning, 1 in Tianjin)

Source: Global Water Intelligence big water companies Jan 2011, Pinsent Masons Water Year Book 2010-2011, relevant companies websites, Bloomberg

Key Domestic Water Companies in the China Market				
Company	Bloomberg Ticker	Technology Strength	Operation and Management in China	Operation type
Anhui Water Resources Development Co Ltd	600502:CH	Former local water SOE expending in water utilities	Almost 1.6 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Beijing Capital Co	600008:CH	Former local water SOE expending in water utilities	Almost 13.2 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Beijing Anling	Not Listed	JV between Beijing Enterprises and Golden State	Almost 2 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Beijing Enterprises Water Group Ltd	371:HK	Former local water SOE expending in water utilities	More than 12.35 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Beijing Herocan	Not Listed	Former local water SOE expending in water utilities	Almost 1.75 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Bio-Treat Technologies	BIOT:SP	Adopt BMS Biological Process Technology	Almost 5.35 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
China Everbright International	257:HK	Former local water SOE expending in water utilities	Almost 6.1 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
China Water Affairs	855:HK	Former local water SOE expending in water utilities	Almost 6.85 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
China Water Industry	1129:HK	Former local water SOE expending in water utilities	Almost 15.6 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Chongqing Kanda Environment	Not Listed	Former local water SOE expending in water utilities	Almost 4.4 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Chongqing Water Group	601158:CH	Former local water SOE expending in water utilities	Almost 15 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects

Source: Global Water Intelligence big water companies Jan 2011, Pinsent Masons Water Year Book 2010-2011, relevant companies websites, Bloomberg



Key Domestic Water Companies in the China Market				
Golden State Environmental	Not Listed	Multi-utilities Chinese and international player	Almost 4 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Guozhen Environment Protection	Not Listed	Former local water SOE expanding in water utilities	Almost 6.5 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Interchina Holdings	202:HK	Former local water SOE expanding in water utilities	Almost 3.5 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Jiangxi Hongcheng Waterworks Co Ltd	600461:CH	Former local water SOE expanding in water utilities	Almost 1.6 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Nanhai Development	600323:CH	Former local water SOE expanding in water utilities	More than 1.1 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Shanghai Industrial Holdings Ltd	363:HK	Former local water SOE expanding in water utilities	Almost 14 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Shanghai Chengtong Holding Co Ltd	600649:CH	Former local water SOE expanding in water utilities	Almost 3 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Shanghai Urban Construction Group	Not Listed	Former local water SOE expanding in water utilities	Almost 3 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Shenyang Public Utility Holdings Co Ltd	747:HK	Former local water SOE expanding in water utilities	Almost 5.8 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Sound Global Group	SGL:SP	Former local water SOE expanding in water utilities	Almost 4 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Tianjin Capital Environment Protection Group Co Ltd	1065:HK	Former local water SOE expanding in water utilities	Almost 12.4 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Wuhan Sanzheng Industry Holding Co	600168:CH	Former local water SOE expanding in water utilities	Almost 1.6 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects
Zhongshan Public Utilities Group Co Ltd	000685:CH	Former local water SOE expanding in water utilities	Almost 2.5 million inhabitants served	JV or full asset acquisitions with local water entities to set up BOT, TOT or OM water projects

Source: Global Water Intelligence big water companies Jan 2011, Pinsent Masons Water Year Book 2010-2011, relevant companies websites, Bloomberg

