



Hong Kong: Water Resources Equipment

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March 2008

Summary

Hong Kong relies entirely on imported water and wastewater treatment products and technologies to meet its needs. In January 2008, the Hong Kong Government (HKG) allocated funds to build the US\$8 million disinfection facilities under the Harbor Area Treatment Scheme (HATS) Stage 2A. This portion of Stage 2A has a completion date in 2009. Another US\$1.02 billion will be spent before 2014 on the construction of more sewage tunnels and the expansion of the centralized treatment plant.

To tackle regional pollution problems, the HKG approved the funding of US\$12 million for the Hong Kong Productivity Council to embark on a 5-year Cleaner Production Program in January 2008 to encourage Hong Kong-owned factories in the Pearl River Delta to practice cleaner production and to treat industrial wastewater before discharging into rivers and streams.

The Environmental Protection Department, the Water Supplies Department and the Drainage Services Department are the primary end-users of water and wastewater treatment products. The most sought after products are filtration, disinfection, desalination, water conservation and ion-exchange technologies. Laboratory equipment and instruments for water quality analysis are also in strong demand.

International and Hong Kong-based engineering consulting companies have been very active in Hong Kong's water and wastewater projects. US equipment suppliers interested in this market should consider setting up strategic partnerships with these engineering consulting firms to obtain project information and equipment requirements.

Market Demand

Hong Kong is a relatively small yet highly urbanized territory of 1,000 square kilometers with nearly 7 million people. There is enormous pressure on its water resources. The territory has been making tremendous investments to meet the population's need for fresh water and wastewater treatment.

Fresh Water

Hong Kong's average annual precipitation of about 2,200mm is insufficient to meet its daily demand for fresh water, which is roughly 2.6 million cubic meters (more than 950 million cubic meters per year). The territory relies on the adjacent Chinese province of Guangdong to provide 70 to 80 percent of its fresh water supply. If necessary, the maximum annual supply of water from Guangdong (Dongjiang water) can reach 1,100 million cubic meters.

The fresh water infrastructure is made up of 17 reservoirs, 21 treatment works, 150 fresh water-pumping stations, 29 salt-water pumping stations, 163 fresh water service reservoirs, and a network of about 6,000 km of fresh water mains and 1,500 km of salt water mains. At present, the total reservoir and water treatment capacities are 586 million cubic meters and 4.8 million cubic meters per day respectively. Water coming from Guangdong Province or from one of the storage reservoirs must undergo treatment before consumption.

During the treatment process, water goes through clarifiers and then to filtration plants to filter out suspended particles. The filtered water is then corrected for pH, disinfected (with ozone and chlorine) and fluoridated with fluoride compound.

Hong Kong adheres to the guidelines and standards as set forth by the World Health Organization (WHO). To meet the standards for both the chemical and bacteriological content of potable water, the Government is evaluating different filtration alternatives such as membrane filtration, and micro- to nano-filtration.

Hong Kong's US\$1 billion, 15-year program of replacing and rehabilitating old water mains across the city started in 2000. Hong Kong is also extending district metering to monitor continuously the flow and pressure across the fresh water distribution system to prevent leakage.

Seawater and Reclaimed Water

To conserve the supplies of fresh water, Hong Kong is increasingly encouraging the use of seawater as an alternative source of flushing water. At present, about 80% of Hong Kong's population use seawater for flushing. Capital works and improvement projects will be carried out over the coming years to extend the supply of seawater.

In addition, Hong Kong is focusing on alternative water resources through the desalination of seawater. A study into the technical and financial viability of seawater desalination by the application of reverse osmosis membrane technology has been completed. Trial operations of a pilot plant confirmed that desalination is technically viable under Hong Kong conditions.

Moreover, pilot water reclamation schemes have been successfully commissioned. Treated effluent from sewage treatment works is further processed to produce reclaimed water for toilet flushing, irrigation and other non-potable uses.

Wastewater

Hong Kong produces about 2.6 million cubic meters of wastewater daily. The public sewage system, consisting of approximately 1,500 km network, 69 sewage treatment plants and 203 sewage pumping stations, is serving 93% of Hong Kong's total population. The majority of sewage (83%) from residential, commercial and industrial premises undergoes primary treatment and the rest receives secondary treatment before discharging in Hong Kong's harbor.

To cope with population growth and to improve the water quality of Victoria Harbor, the HKG has invested more than US\$2.5 billion to implement Stage I of the Harbor Area Treatment Scheme (HATS) (formerly known as the Strategic Sewage Disposal Scheme) and plans further investments in the subsequent stages.

Harbor Area Treatment Scheme (HATS)

HATS 1

Under HATS, a deep tunnel network collects screened sewage from all the preliminary treatment works around Victoria Harbor and delivers it to centralized facilities for chemical treatment and disinfection prior to discharging it into the sea. HATS Stage 1 consisted of building a 23 km deep tunnel conveyance system, a centralized primary treatment plant at Stonecutters Island and a 1.7 km submarine discharge oceanic outfall. These were completed in 2001.

HATS 2

Stage 2A of HATS requires the provision of additional disinfection, the construction of more sewage tunnels and expansion of existing chemical treatment capacity at Stonecutters Island, whereas Stage 2B requires the installation of a biological treatment plant adjacent to Stonecutters Island.

The total estimated cost of Stage 2A is about US\$1.03 billion with a completion date in 2014. In January 2008, the HKG allocated funds to build the US\$8 million disinfection facilities under HATS Stage 2A. This portion of Stage 2A has a completion date in 2009. The HKG will also build sludge treatment facilities to avoid dumping huge volumes of sludge at landfills.

Stage 2B will involve the building of a biological treatment plant next to Stonecutters Island Sewage Treatment Works. The capital cost of which is about US\$1.4 billion. A pilot plant involving the use of Biological Aerated Filters (BAF) technology for treatment has been set up and proven to be successful. The HKG will review whether to move forward with Stage 2B in 2010/2011. The decision is largely dependent on the polluted flows from the Pearl River Delta (PRD) region. If the water quality in the PRD region continues to deteriorate, there is little incentive for the HKG to spend money on additional wastewater treatment infrastructure.

Industrial Wastewater

The market for industrial pollution prevention equipment has been increasing. Most of Hong Kong's manufacturers (estimated total of 80,000 industrial establishments) have shifted their production base to southern China. Traditionally, these manufacturers purchase plant and equipment from Hong Kong suppliers. Recently, the environmental authorities in southern China have increased pressure for these manufacturing facilities to recycle as much as 75 percent of its water consumption, and thus have created a rise in the demand for water reuse and recycling technologies.

Given the large number of enterprises with Hong Kong ownership connections are operating in the Pearl River Delta (PRD) and the rest of Guangdong Province, the HKG approved the funding of US\$12 million for the Hong Kong Productivity Council to embark on a 5-year Cleaner Production Program in January 2008. This program aims to encourage manufacturing industries in the PRD to practice cleaner production. The measures cover enhancement of operation management, efficient use of energy, production process improvement, minimization of industrial wastewater, and recovery of precious materials in the wastewater stream. The Hong Kong Productivity Council will focus its efforts on the following highly water polluting industry sectors: textile; non-metallic mineral products; metal and metal products; food and beverage; chemical products; printing and publishing; paper and paper products manufacturing; and furniture manufacturing. In addition to HKG's injection of funds, five major banks in Hong Kong launched the Green Finance Scheme on January 31, 2008 to provide financing at favorable terms for Hong Kong manufacturers in the PRD to implement Cleaner Production projects. They include the Bank of China (Hong Kong), Dah Sing Bank, Hang Seng Bank, the Bank of East Asia and the Hongkong and Shanghai Banking Corporation.

HKG levies a Trade Effluence Surcharge (TES) upon 30 trades and industries, based on the pollutants level – the chemical oxygen demand (COD), biochemical oxygen demand (BOD), and oil and grease – in the wastewater discharge. Since most of Hong Kong's manufacturing industries have moved to south China, the majority (almost 40%) of the sewage revenue, TES included, come from the local food & beverage industry which consists of more than 9,000 restaurants and several sizable food processing companies. To reduce expenditure on TES, some restaurant owners and large food processing companies have installed grease traps and micro wastewater treatment plants on their premises respectively. However, these units require regular and costly maintenance. Proven technologies, such as ultra-filtration or biotech (enzyme), are welcomed by the industry.

Market Data

Cost Estimates of HATS Stage 2

	Capital Cost	Annual Operating Cost
Stage 2A	US\$ 1,030 million	US\$ 54 million
Stage 2B	US\$ 1,393 million	US\$ 90 million
Stage 2 Total	US\$2,423 million	US\$ 144 million

Source: HKG

Industrial Wastewater Treatment Market

The total injection from HKG on Cleaner Production Projects (including water minimization and recovery projects) for the next five years will be US\$12 million. This funding will largely be used by the Hong Kong Productivity Council for carrying out preliminary onsite assessment of Hong Kong manufacturing plants in the PRD. Anticipated number of onsite assessment projects is in the range of 800 to 1,000 for the duration of this HKG initiative. Five Hong Kong local banks have committed to supporting the actual cleaner production projects and thereby resulting in a multiplier effect. The market for industrial wastewater treatment appears to be very promising.

Best Prospects

With water quality deteriorating and an increasing awareness of environmental protection, Hong Kong is utilizing and assessing various advanced filtration technologies to improve the quality of potable water and to reduce wastewater pollutants. These water treatment technologies include micro- to nano-filtration, membrane technologies, reverse osmosis and UV disinfection technologies.

Filtration

Conventionally, Hong Kong uses sedimentation process in its fresh water treatment. With improving technology, Sham Tseng Water Treatment Plant has adopted a water clarification technique called Dissolved Air Flotation (DAF); Ma On Shan Plant now uses membrane filtration technique. The Ngau Tam Mei Water Treatment Plant won the American Academy of Environmental Engineers (AAEE) Award by being the first in the world to utilize dual-stage biological filtration with granular activated carbon to remove ammonia.

Disinfection

The Government is currently investigating several disinfection technologies including ultra-violet irradiation, ozonation, chlorination/de-chlorination and membrane filtration. A number of criteria must be met when making a decision, such as performance level, undesirable disinfection by-products, land requirement for the installation, and operation costs. The Stonecutters Island Wastewater Plant employs ozone disinfection, a technology with no undesirable by-products.

Desalination

Desalination technology is not new to Hong Kong. The territory's first desalination plant (managed by a UK firm and with Japanese equipment) opened about three decades ago. Owing to high operating costs, the plant was decommissioned. With desalination technology becoming more cost competitive, in 2001, the Water Supplies Department conducted a feasibility study on the development of desalination facilities. The study identified reverse osmosis (RO) as being the most suitable technology in terms of cost efficiency and effectiveness.

Laboratory equipment and instruments

The Hong Kong Water Supplies Department monitors fresh water quality throughout the entire supply system with examination of chemical, bacteriological, biological, and radiological contents in water samples to ensure the quality complies with the drinking water quality guideline recommended by the World Health Organization (WHO). Currently, there are more than 100 testing parameters and the Department performs 150,000 tests a year. Whenever WHO sets new guidelines, which translate to new testing parameters, there will be a demand on new testing instruments.

Water conservation, re-use and recycling

Water conservation can help reduce the pressure of fresh water demand generated by a population increase. Hong Kong is looking for measures to implement water loss control technologies in order to control waste. For instance, replacement and rehabilitation of water mains is a Government initiative toward controlling water loss. Hong Kong's first tertiary sewage treatment plant, Ngong Ping Sewage Treatment Works, has been in operation since late 2005. The high quality effluent is used for flushing and controlled irrigation.

Industrial wastewater recycling

As a result of China's increasingly stringent wastewater discharge standards and its plan to cut industrial water consumption, there has been increasing demand for recycling of wastewater for industrial process use. As a result, the potential of tertiary wastewater treatment technologies such as membrane technology for ultra/nano-filtration is becoming more promising, particularly for wastewater recycling in printed circuit board manufacturing, textile bleaching & dyeing, and pulp & paper manufacturing.

Ion-exchange technology for heavy metal recovery

In the manufacturing or surface finishing of metal products, wastewater and/or chemical waste containing various heavy metals are generated, which call for proper treatment and/or disposal in order to comply with the relevant legal requirements. Manufacturers and consulting companies specializing in precious metal recovery from waste stream are applying ion-exchange technologies in the recovery process. Examples include the recovery of copper from printed circuit board manufacturing and silver from the film development process of printing operations.

Key Suppliers

US consulting firms have won many water treatment contracts with the Hong Kong Government:

- A US engineering firm was the consultant for the US\$75 million Ngau Tam Mei Water Treatment Plant, which utilizes ozone generators, biological and membrane filtration technologies
- Another US firm carried out a pilot trial for the next phase of HATS for secondary treatment – compact non-BAF (biological aerated filtration) technology of effluent prior to discharging into Victoria Harbor. External partners of this project include Thames Water and Severn Trent.

Third-Country Suppliers

Major local and third country engineering consulting firms active in the Hong Kong market include Mott Connell (laying water mains), Ove Arup (investigation, design and construction stage services for HATS 2A), ENSR (rehabilitation of water mains), and ATAL (HATS tertiary treatment pilot plant). Cutting-edge technology providers are able to participate in Hong Kong's water and wastewater treatment projects. Trojan Technologies, a Canadian based company, sold US\$12 million worth of UV disinfection systems to Hong Kong. Japan has been participating in Hong Kong's water treatment projects for several decades. Mitsubishi Rayon provided hollow fiber membranes for wastewater treatment.

Prospective Buyers

Environmental Protection Department (EPD)

The EPD is the government administrative body overseeing and managing the Hong Kong public sector waste and wastewater projects and is the key body for all future purchasing decisions. EPD's web site is: www.epd.gov.hk/epd

Water Supplies Department (WSD)

The WSD is responsible for the supply of adequate and quality potable water and seawater in Hong Kong. WSD's web site is: www.wsd.gov.hk

Drainage Services Department (DSD)

The main task of the DSD is to provide Hong Kong with a high standard of protection against flooding, as well as an effective system for sewage collection, treatment and disposal. DSD's web site is: www.dsd.gov.hk

Market Entry

Role of Consulting Companies

International engineering consulting companies and equipment suppliers are participating in large-scale water quality and sewage control projects of Hong Kong. Contracts vary from implementing advanced filtration technology, rehabilitation of major water mains, providing consulting services to installing industrial water treatment systems.

Equipment suppliers interested in this market normally maintain an excellent working relationship with engineering consulting firms that are active in Hong Kong's water projects to obtain up-to-date project information and equipment requirements. Normally, a water and wastewater project involves a feasibility study, design, project management, construction and equipment installation. The HKG purchases equipment and services through a competitive bidding process. In general, the engineering consulting company winning the detailed design contract will manage the whole project including specifying equipment requirements. There are several international engineering consulting firms active in Hong Kong's water projects, including Camp, Dresser & McKee International (CDM), Black & Veatch (formerly Binnie Black & Veatch), ENSR Asia (HK) Ltd. (formerly Maunsell), Ove Arup & Partners Hong Kong Limited Scott Wilson and Mott Connell.

Market Issues & Obstacles

No Import Tariff or Duties

Hong Kong is a duty free port. There are no tariff or other barriers to the import of water treatment equipment to Hong Kong.

Government Tenders

Information on HKG Tenders is available at this web site: www.ets.com.hk

Working with Local Agents / Distributors

For smaller-scale industrial wastewater treatment equipment, it is advisable to use an agent or distributor to penetrate the Hong Kong market. It is also an excellent way of minimizing the initial investment in the market. Working with agents and distributors in Hong Kong is very much like working with an agent in the United States. Hong Kong has no special legislation regarding agents and distributors. Virtually anything that both sides can agree to and put into a written contract is acceptable and enforceable, including restrictions on territory and a grace period for termination of the agreement.

Standards

Hong Kong recognizes international standards. U.S. companies seeking to export to Hong Kong should check with potential agents and customers to determine exact standards required.

CEPA - Hong Kong Closer Economic Partnership Arrangement

Under the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA), the Mainland China has, since 1 January 2006, granted all products of Hong Kong origin tariff free treatment upon applications by local manufacturers and subject to satisfying the agreed CEPA rules of origin (ROO). Up to date, ROO have been established for a wide range of goods including some environmental equipment such as heat exchangers and dust collectors, which are now eligible for the tariff free treatment. In addition, the Mainland China has also agreed to provide preferential treatment to Hong Kong service suppliers in over 20 service areas, including environmental services. As a result, partnering with relevant Hong Kong companies in the provision of environmental services and/or manufacturing of pollution prevention equipment can provide US companies with added advantages to capitalize on the present and future CEPA benefits for tapping into the China market.

Commercial Service Hong Kong's Pollution Prevention & Energy Efficiency (P2E2) Initiative

Many of Hong Kong environmental problems have been created by rapid industrial growth in southern China, including the water quality problem in the PRD. These problems can be solved by the introduction of new pollution prevention and pollution control technologies, with financing provided through loan guarantees from multilateral banks endorsing the P2E2 program.

In May 2005, U.S. Commercial Service in Hong Kong organized a highly successful international conference on pollution prevention and energy efficiency. Officials and businesses from both the PRD and Hong Kong participated. As a result of that event, a new business model was developed specifically for Hong Kong and the PRD, which builds on five years of cooperation between the Chinese State Environmental Protection Administration and the U.S. Environmental Protection Agency. Called "P2E2," this new environmental finance model allows Hong Kong-owned factories in China, in sectors as diverse as textiles, electronics, food processing, iron, steel, cement and a number of other sectors, to adopt new technologies with no upfront capital costs. These new P2E2 technologies will improve industrial productivity, reduce operating costs and reduce air, water and ground pollution. This innovative model does not require manufacturers to commit upfront capital. Instead, savings in energy, water and raw materials, as well as increases in productivity and profitability, more than offset the costs of the pollution abating, energy saving improvements. This is a model where everyone wins, including the general public. It should appeal to Hong Kong's business sector, and Hong Kong can play an important role in improving the natural environment as well as its business environment.

The P2E2 model, once applied, creates new buyers for environmental and energy technologies, as well as new export opportunities for U.S. financial, legal and engineering services firms. U.S. companies that are potential P2E2 technology suppliers and service providers are encouraged to contact the U.S. Commercial Service in Hong Kong for program updates and export opportunities. Additional information on the P2E2 model is available from this web site: <www.buyusa.gov/hongkong/en/about_p2e2.html>.

Trade Events

Macao International Environmental Co-operation Forum & Exhibition (MIECF) 2008

Date: April 23-25, 2008

Venue: The Cotai Strip Convention and Exhibition Center at The Venetian

Website: <http://www.macaomiecf.com/>

CIEPEC 2008

April 27-29, 2008

Intex Shanghai and Shanghai Mart

Website: www.eptee.com/en/default.asp

GreenTech Expo 2008

Date: Sept 17-19, 2008

Venue: Shenzhen Convention & Exhibition Center

Website: <http://www.greentech-exhibition.com/>

Eco Expo Asia - International Trade Fair on Environmental Protection

Date: Oct 28 – 31, 2008

Venue: Asia World Expo, Hong Kong

Website: <http://ecoexpoasia.tdctrade.com/>

Resources & Contacts

The Hong Kong Institution of Engineers

www.hkie.org.hk

The Chartered Institution of Water and Environmental Management (CIWEM) in Hong Kong
www.ciwem.org/branches/hong_kong

Air & Waste Management Association, A&WMA, HK Section
www.awma.org.hk

Green Council
www.greencouncil.org

Hong Kong Environmental Industry Association
www.hkenvia.org

Hong Kong Green-Manufacturing Alliance
www.gma.org.hk

Hong Kong Productivity Council
www.hkpc.org

For More Information

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Comments and Suggestions: We welcome your comments and suggestions regarding this market research. You can e-mail us your comments/suggestions to: Customer.Care@mail.doc.gov. Please include the name of the applicable market research in your e-mail. We greatly appreciate your feedback.

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