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Desalination Industry Report

China to invest USD 3.43bn in desalination industry with a target capacity to reach at least 2.2m cubic meters per day

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Recent developments

 In October 2013, China's eastern Jiangsu province recently saw one of its cities, Yancheng, selected by the central government as one of the second batches of pilot cities for the country's seawater desalination industrial development.

 On 12 October 2013, Qingdao, Shandong province, one of the cities running desal pilot programs, passed a plan (青岛市海水淡化装备制造业发展规划) on developing its seawater desalination equipment manufacturing industry, which entails a goal of lifting the industrial output value to USD 983m (CNY 6bn) by 2020. Qingdao also aims to complete an industrial supply chain in the city covering manufacturing of both membrane-process desalination equipment and thermal desalination equipment, with the presence of two or three large-scale leading enterprises, by 2020. Breakthroughs are expected to be made in areas such as membrane materials, membrane modules, energy recover devices, high-pressure pump and ejector vacuum pump. As previously reported, the plan, which was not finalized at the time, also set a goal to bring the industrial output value to USD 322.6m (CNY 2bn) for 2015, which will help the city seize a 25% share in China's domestic market. The city realized USD 81.5m (CNY 500m) in output value of seawater desalination equipment manufacturing industry in 2012, accounting for 10.6% of China's domestic market.

Overview

China's National Development and Reform Commission (NDRC) on 21 December 2012 announced its 12th Five-Year Plan for seawater desalination, declaring a set of goals to be fulfilled by 2015. During the 11th Five-Year Plan period (2006-2010), the annual average desal capacity in China increased by 60%. By the end of 2010, China had over 70 operating desal plants with a capacity of 600,000 cubic meters per day. Meanwhile, the number of desal plants currently under construction remains at five; the plants possess a designed capacity of 260,000 cubic meters per day (66% is based on reverse osmosis technology, 33% is based on low-temperature multi-effect distillation technology and the rest is dependent on other technologies).

At the end of 2011, China's seawater desalination capacity amounted to 660,000 cubic meters per day, 70% of which was designed for industrial use while the remaining 30% served as drinking water. Investment in desalination during 12th Five-Year Plan period - mainly through cooperate fundraising, bank loans, "social financing" (including IPOs and bond issuance), foreign capital and government subsidies - is estimated at USD 3.43bn (CNY 21bn). Of that amount, roughly USD 2.7bn (CNY 165bn) went towards desal and annexed pipeline network projects, USD 570m (CNY 35bn) in desal base construction and USD 160m (CNY 10bn) in related regulation establishment.

Problems constraining development of desalination: a lack of understanding regarding the importance of the industry; an inability to independently innovate when it comes to key techniques and technologies; the domestic enterprises engaging in seawater desalination are generally small in scale and have little experience in the field; the government is not doing enough to properly incentivize the development of the sector; the cost of desalination is significantly higher than that of tap water; the high cost of desalination has resulted in lackluster sales nationwide.

Regulatory Summary

 China's 12th Five-Year Plan for seawater desalination industry (2011-2015) stated that the main aim of the seawater desalination industry is to increase capacity. Data from the 12th FYP indicated that by the end of 2015, China's seawater desalination capacity is targeted to reach at least 2.2m cubic meters per day. Another goal of the industry is to facilitate improvements within the country's industrial chain. China has set a USD 4.9bn (CNY 30bn) target for the seawater desalination industry that it wants to reach by the end of 2015. In an effort to rely less on imports, the country is also looking to achieve an independent innovation rate of at least 70% when it comes to raw materials and equipment manufacturing. By the end of 2012, China's seawater desalination capacity was reported to be 0.7m cubic meters per day, meanwhile, the independent innovation rate just reached 40%, far from the target in the FYP.

 August 2013 - Tianjin's Binhai New District launched a plan on water conservation, which included accelerating desal to satisfy water demand in the region. The district expects desal capacity to reach 480,000 tons per day by 2015.

 May 2013 - Qingdao, Shandong province, released plans of becoming a leader in desal equipment manufacturing. It estimated Qingdao's desal equipment manufacturing industry to reach USD 322.6m (CNY 2bn) in production output value by 2015, which will help it seize a 25% share of the Chinese market. In August, the city announced plans to increase industrial output to USD 983m (CNY 6bn) by 2020. The plan projected Qingdao would capture a 35% market share in China's market.

 2007 - The State Council announced Regulation on the Implementation of the Enterprise income Tax Law of the People's Republic of China (中华人民共和国企业所得税法实施条例). Article 88 of the regulation set preferential tax treatment for companies operating in certain industries - generally environmental protection and energy and water conservation sectors including seawater desalination, sewage treatment and emission reduction. A relevant company is exempted from taxes during the first three years while it is in operation and producing income. During the following three yeras, the company is exempted from paying half of its income taxes.

 2007 - The NDRC announced Catalogue for Enterprise Income Tax Preferences for Environmental Protection and Energy and Water Saving Projects (Trial) (环境保护节能节水项目企业所得税优惠目录（试行）), which was a list of environmental protection projects that were eligible to receive tax exemptions under the State Council's Regulation on the Implementation of the Enterprise Income Tax Law of the People's Republic of China (中华人民共和国企业所得税法实施条例). The two requirements for desal projects to receive the tax breaks were: 1) For project to provide drinking water for residents on island areas, power consumption index for MED project is less than 1.8 kWh/ton and the GOR (gained output ratio) index is more than 8, while power consumption index for SWRO project is less than 4 kWh/ton. 2) For projects on industrial water or drinking water for people in other places, indexes for each kind of project remain as above. But, additionally, the project capability cannot be smaller than 10,000 m3/d.

Supply chain

Related Chinese companies

Engineering

 Hangzhou Water Treatment Technology Development Center (杭州水处理技术研究开发中心有限公司) is a general contractor and equipment supplier. Affiliated with China National BlueStar (Group) Co., Hangzhou Water Treatment Technology Development Center is the supporting unit of the National Engineering and Technological Research Center for Liquid Separation Membrane and a base for the national membrane sector. Established in 1984, the center was previously a scientific institute under the State Oceanic Administration. In 2006, it joined China National BlueStar and specializes in membrane-based water treatment technology, product development, engineering design, production and system integration. Covering an area of 2.67 hectares with registered capital of CNY 95m (USD 15m), it has nearly 300 employees, and considers 70% of the staff to be technical experts. The center boasts of one academician, six experts that enjoy special governmental allowances, 50 senior technical employees and 69 intermediate technical staff members. It is one of the earliest domestic membrane R&D institutions and a leader in the liquid separation membrane sector.

Beijing Enterprise Water Group Ltd (BEWG) (北控水务集团有限公司) is a general contractor and investor. Listed on the main board of the Stock Exchange of Hong Kong Limited (Stock Code: 0371), BEWG is a large-scale group which has its own competitive

advantage in the water supply industry in mainland China. It has strategically positioned itself as a "leading integrated water system solution provider." It has strategically positioned itself as a "leading integrated water system solution provider." Leveraged on its market-oriented approach, solid capital foundation, advanced technology and sound management, the group focuses on its core businesses - water supply and sewage treatment - as well as environmental protection.

Zhonghe Seawater Desalination Engineering Co. (众和海水淡化工程有限公司) was established via the cooperation of three state-owned organizations and the scientific research institutes: Dongfang Turbine Investment Development Co., a wholly owned subsidiary of Dongfang Electric Corporation, CECT Development Co., a wholly owned subsidiary of China Power Engineering Consulting Group, the State Oceanic Administration and Tianjin Institute of Seawater Desalination and Comprehensive Utilization. Founded in March 2007 with a registered capital of CNY 80m, Zhonghe is located in West Area of Tianjin Economic and Development Area. By combining technologies in the public domain with its own proprietary innovations, Zhonghe is able to engage in engineering consulting, design and equipment manufacturing of sea and brackish water desalination projects. Its business scope covers low-temperature multi-effect seawater desalination, reverse osmosis seawater desalination, feed water for power plant boilers, pure water and ultra-pure water, sewage water reclamation and industrial wastewater treatment facilities.

Shenhua Group (神华集团) is an investor and engineer. The Shenhua Group Corporation Limited ("Shenhua Group" for short) is a wholly state-owned company founded in October 1995 with the approval of the State Council. Operating directly under the control of the central government, it is a large-scale energy enterprise which operates primarily with the use of coal within the electric power, railway, port, shipping, coal-to-liquids, coal chemical engineering and transportation sectors. It is the largest and most advanced coal enterprise in China and the largest coal distributor in the world. The company is headquartered in Beijing. The China Shenhua Energy Company Limited – wholly founded by the Shenhua Group – is a listed entity in Hong Kong and Shanghai. On the Global Top 500 Enterprises 2012 list compiled by Fortune Magazine, Shenhua Group ranked 234.

Membrane suppliers

KeenSen Technology Co. (沁森环保科技有限公司) is a reverse osmosis membrane producer. Founded in May 2010, KeenSen is located in the Changsha High-tech Development Zone. Supported as one of the five key environmental protection enterprises by Hunan province, it has captured a large share of China's membrane market.

Vontron Technology Co., Ltd. (时代沃顿) is specialized in R&D, manufacture and technical service of RO and NF membrane elements. Owning the core technology and capability for fabrication of membrane sheet, Vontron is the biggest professional

manufacturer of compound RO membranes in China, and is the provider of system design and applied service with powerful technical support.

Existing or potential suppliers

Membrane suppliers

The Dow Chemical Co. (DOW), based in Michigan, reported strong growth in its China Water & Process Solutions business in 3Q13 due to healthy demand in reverse osmosis (RO) technologies in Asia Pacific. During the company's earnings call on 24 October, CFO William Weideman outlined several areas of growth in the region, including performance plastics, specialty materials and building and construction. DOW makes RO and nanofiltration (NF) elements for demineralizing brackish water or desalinating seawater for a variety of industries and applications, including industrial water treatment, power generation, food & beverage processing, municipal desalination and water reuse, and home drinking water devices. Its FILMTEC ECO elements – which deliver up to 40% lower salt passage at up to 30% less energy than standard RO elements received a Chinese water industry innovation award in July, according to a company press release.

 Hydranautics has been committed to the highest standards of technology research, product excellence and customer satisfaction since its founding in 1975. Hydranautics entered the reverse osmosis (RO) water treatment field in 1970, and is now one of the most respected and experienced firms in the membrane separations industry. Hydranautics became part of the Nitto Group when it was acquired in 1987. Hydranautics corporate headquarters is located in the city of Oceanside, California in a 160,000 ft2 (14,684 m2) manufacturing facility residing on 14 acres, all owned by Hydranautics.

Toray Group fuses nanotechnology into its operations, using organic synthetic chemistry, polymer chemistry and biotechnology as its core technologies. In addition to the Foundation Businesses of fibers & textiles and plastics & chemicals, Toray likewise promotes the global development of IT-related products, carbon fiber composite materials, pharmaceuticals and medical products, environment & engineering including water treatment and progress in other pivotal business fields.

Pump suppliers

KSB is an expert in pumps, valves and systems for building services, industry, water engineering, the energy sector and mining. As a global player, KSB provides services and produces complete hydraulic systems for the transport of water and waste water in all industries.

Energy Recovery

ERI is a US-based company engaged in energy recovery. Its technology is popular in the field because of its over 120 years of combined industry experience.

Integrated solution providers

Aqualyng is a global leader in the international desalination market. Our spectrum of successful, state-of-the-art products & services deliver fresh water – whenever and wherever it is needed. In the relatively short span of time since 1998, it has garnered an excellent industry reputation for delivering desalination plants for production of all qualities of water.

Abengoa (MCE: ABG.B/P SM /NASDAQ: ABGB) applies innovative technology Solutions for sustainability in the energy and environment sectors, generating electricity from renewable resources, converting biomass into biofuels and producing drinking water from sea water. Abengoa's business is structured around three activities. Hyflux is a leading provider of integrated water management and environmental solutions with operations and projects in Singapore, Southeast Asia, China, India, Algeria, the Middle East and North Africa.

IDE, a world leader in water treatment solutions, specializes in the development, engineering, construction and operation of enhanced desalination and industrial water treatment plants. IDE leads the water industry with some of the world's most advanced thermal and membrane desalination plants. It has an especially well-proven track record in large-scale membrane and thermal desalination, including some of the largest plants worldwide, (e.g. in China, India, US, Australia and Israel). IDE also has proven experience in ground-breaking industrial water treatment plants that deliver reliable, sustainable and economical solutions for industry.

Major projects

China National Development and Reform Commission (NDRC) in March 2013 published its first batch of pilot units, including cities, islands and companies, for developing the country's seawater desalination industry.

The selected units are as follows:

- Pilot cities: Zhoushan (Zhejiang) and Shenzhen (Guangdong);
- Pilot industrial parks: Tianjin Binhai New District (Tianjin), Bohai New District (Changzhou city, Hebei);
- Pilot islands: Luxixiang Island (Zhejiang);
- Pilot industrial base: Development Center of Water Treatment Technology (Hangzhou);
- Pilot water supply unit: Tianjin SDIC Jinneng Electric Power Co., Ltd;
- Pilot bitter-salt water desalination unit: Huan County (Gansu)

Existing desalination capabilities above 10,000 m3/d

- Hebei Huanghua Power Plant desal system, 32500 m3/d, MED
- Tianjin Beijiang Power Plant desal system, 100000 m3/d, MED
- Tianjin Dagang Xinquan desal system, 100000 m3/d, MED
- TEDA desal plant, 10000 m3/d, SWRO
- Huaneng Yingkou Power Plant desal system, 10000 m3/d, SWRO
- Shougang Jingtang Steel Co., Ltd. desal system, 50000 m3/d, MED
- Caofeidian Industrial Park desal plant, 50000 m3/d, SWRO
- Datang Wangtan Power Plant desal system, 10800 m3/d, SWRO
- Liaoning Hongyanhe NPP desal plant, 15000 m3/d, SWRO
- Dairen Chemical Corp. desal plant, 20000 m3/d, SWRO
- SGCC Dalian Zhuanghe Power Plant desal system, 14400 m3/d, SWRO
- Qingdao Soda Ash Industrial Co., Ltd. desal plant first phase, 20000 m3/d, SWRO
- Hangdao Power Plant desal system, 10000 m3/d, SWRO
- Qingdao City desal plant, 100000 m3/d, SWRO
- Zhoushan Liuheng desal plant, 20000 m3/d, SWRO
- Zhejiang Yunhuan Huaneng Power Plant desal system, 20000 m3/d, SWRO
- Zhejiang Leqing Power Plant desal system, 21600 m3/d, SWRO

Planned desalination capabilities

- China Beijing MED 50,000m3/d thermal desal plant Conceptual stage
- China Bohai New Area, Hebei 50,000m3/d SWRO Awaiting EPC tender
- China Caofeidian expansion 1 million m3/d – 3 million m3/d SWRO
- China Changxing Island Economic Zone 50,000m3/d Phase 1 SWRO MOU signed
- China Desalination R&D centre, Hebei 50,000m3/d SWRO Planned