Water Desalination Report

The international weekly for desalination and advanced water treatment since 1965

Volume 43, Number 7 19 February 2007

Rhode Island

Ocean state looks to the Ocean

Reservoirs currently provide 85 percent of Rhode Island's public water supply and state senator Lou Raptakis thinks a plan to build another $1.2 billion reservoir to provide 27 MGD of additional water is too costly and could be an environmental catastrophe. He told *WDR*, "It would be faster and less expensive if we were to consider some combination of wells and desalination, and we wouldn't destroy any wetlands".

The state has a population of slightly more than one million people and consumes 136 MGD of water for domestic, industrial and irrigation purposes. With a total area of 1,214 square miles, there is no point in the state more than 30 miles from the coast. RIWRB general manager Juan Mariscal advocates wastewater reuse and recycling and notes, "Water is not always readily available when and where it is needed."

According to Henry Meyer, manager of the Kingston Water District, system failures and natural calamities could leave much of the city-state without water. "We need backup supplies to our primary sources in all regions of the state," he said.

Raptakis said the state's water supply needs immediate attention, and a joint Senate and House committee will consider options. "A Rhode Island Water Resources Board (RIWRB) study estimated that an alternative providing 5 to 7 MGD of treated groundwater could cost $30 million and a 10 MGD plant similar to the one in Brockton could cost $70 million," he said.

The senator recently returned from Greece where he was impressed with their desalination approach. "They have developed an environmentally friendly, floating desalination platform that uses wind energy and doesn't have to be linked to the power grid. Rhode Island has plenty of wind and a lot of ocean, and we need a forward-looking approach that takes advantage of our resources," he told *WDR*.

He even has identified a site at Quonset Point that he thinks could be ideal for a seawater desalination plant. "We are the Ocean State and we should consider the ocean as a possible water supply solution. If we don't do something soon, water may become a scare resource here," he said.

2007 Global Water Awards - Part 2

A judging panel of *WDR* and *GWI* editorial teams and senior industry representatives has prepared a shortlist of nominees for the 2007 Global Water Awards from among those submitted. Last week's *WDR* contained summaries of shortlisted nominees for some categories and nominees for second set of categories are included below. Now it's over to you – the *WDR* subscribers, along with *GWI* subscribers and IDA members – to make the final decision. A voting system and a full list of categories are posted at www.globalwaterawards.com website and you will have until the last week in February to cast your vote. Votes will be audited and the final awards will announced at the GWI 2007 Conference in Barcelona on 2-3 April

Desalination Deal of the Year - For the deal that represents the most significant step forward for the industry in terms of financial innovation or in meeting the demands of challenging circumstances:

Beni Saf SWRO, Algeria – a BOO contract for a 200,000 m^3/d (54 MGD) desalination plant in western Algeria. The Geida consortium of Befesa, ACS Cobra Tedagua and Sacyr Vallehermoso in association with the Algerian Energy and Algérienne des Eaux are responsible for the project. ADE and Sonatrach are the off-takers. Beni Saf is the most socially and politically sensitive project in the Algerian Desalination program. The Geida consortium has already shown that it has the commitment to do what it takes to deliver the project to the timetable: it has 70 expatriates on site to address site preparation issues.

Chennai Minjur SWRO, India – a 25-year BOT contract for a 100,000 m^3/d (26.4 MGD) desalination plant to serve Chennai Metropolitan Water Supply and Sewerage Board in Tamil Nadu. A consortium of Befesa and IVRCL has been awarded the contract for the plant. The debt component is $85 million, with Washington-based IFC lending $17 million, and the rest coming from three state-owned banks. This is the first major desalination project to reach financial close in a low-income country and has been achieved without grants or subsidies. It is a triumph for the client, the development company and the banks backing the project. It opens the door for further large-scale desal projects in a country badly in need of sustainable water sources

Global Water Intelligence

Tom Pankratz, Editor, P.O. Box 75064, Houston, Texas 77234-5064 USA
Telephone: +1-281-857-6571, www.waterdesalreport.com, email: tp@globalwaterintel.com

Hadera SWRO, Israel – a 273,000 m^3/d (72 MGD) project to be built on a 25-year BOT basis. The H2ID consortium of IDE and Housing and Construction was awarded the contract and Portugal's Banco Espirito Santo and Germany's HVB led the consortium financing the $250 million project. The Hadera project was the largest stand-alone desalination project tendered last year. H2ID's proposal is a stunning piece of engineering – both in terms of membrane technology and financial wizardry. This is reflected in the fact that the first-year water price was 16 percent lower than the next best bid, and 7 percent lower than the record achieved at Ashkelon.

Torrevieja SWRO, Spain – a 15-year DBO contract for a 240,000 m^3/d (63.4 MGD) desalination plant in Alicante. The winning consortium of Acciona Water and local construction partner Romymar won the tender with a bid of €297.2 million ($390 million). Torrevieja is the largest seawater desalination plant in Spain's Acuamed program, with the potential for a 50 percent future expansion. The proposal includes a bioclimatic regulation system and 585 solar panels to reduce demand for mains electricity, and with non-energy costs capped at €0.06/ m^3, Torrevieja could offer the lowest operating costs for a membrane desalination plant achieved this year.

Power and Water Deal of the Year - For the deal, signed before the end of January 2007, that reflects the most significant progress in terms of financial innovation or in meeting the demands of challenging circumstances:

Barka 2/Al Rusail, Oman – the purchase of Al Rusail 665 MW IPP to be extended with a 120,000 m^3/d (32 MGD) & 678 MW desalination and power plant. The winning consortium comprises Suez Energy Int'l, Mubadala Development Company and National Trading Company, with EPC contractor Doosan Heavy Industries and the RO technology supplied by Degrémont. The project represents the first time that RO technology has been proposed for a major IWPP. The client asked development consortia to submit bids without a guaranteed base-load capacity, reflecting the reality of power demand in the Gulf region, and requiring an imaginative approach from the developers.

Fujairah I IWPP – the purchase of the recently completed 454,000 m^3/d (120 MGD) RO-MSF hybrid desalination plant with a 662 MW power component, to be expanded to 887 MW. Emirates SembCorp Water & Power Company, owned 60 percent by ADWEA through its Taqa subsidiary and 40 percent by SembCorp Utilities. Doosan was the EPC contractor, and Degrémont the membrane desalination supplier for the project. SG and Barclays arranged the $1.5 billion financing. The plant had encountered a number of operational difficulties before and after commissioning, making the asset sale difficult. But it is a tribute to the legal structure of the projects, the determination of ADWEA, and the vision of SembCorp, that the deal went through.

Hidd IWPP, Bahrain – the purchase of a 136,500 m^3/d (36 MGD) MED desalination and 910 MW power plant, with the desal element to be expanded to 409,265 m^3/d (108 MGD). Hidd Power Company, owned by International Power, Suez Energy Middle East/Tractebel and Sumitomo Corporation with Sidem as the EPC contractor for the water plant. 60 percent of the $1 billion debt was provided by the Japan Bank for Int'l Cooperation with six institutions providing the remainder. BNP Paribas was financial advisor, Mott MacDonald technical advisor and Freshfields Bruckhaus Derringer legal advisor to the Ministry of Finance & National Economy (MoFNE). The project is the first IWPP in the region in which MED had been proposed, and moved ahead faster than any other IWPP, with just five weeks from the appointment of the preferred bidder, to the signing of the power and water purchase agreement. First water production is due in April 2007.

Jubail IWPP, Saudi Arabia – an IWPP with an 800,000 m^3/d (211 MGD) MED desalination component and a 2,500 MW power component. The power and water purchase agreement was signed in December 2006, but the $3.4 billion financing had yet to close at press time. Marafiq, Saudi Electricity Co, Saudi Public Investment Fund and a developer consortium of Suez-Tractebel, Gulf Investment Corp and ACWA Power Projects with EPC contractors GE, Hyundai Heavy Industries and Sidem. Marafiq, the power and water utility for the Royal Commission, is the off-taker. This is the largest greenfield IWPP investment to date, but despite this challenge and the shortage of EPC contractors, it still attracted three competitive bids. The success of MED technology changes the rules for large-scale Gulf desalination projects, guaranteeing tight competition on future projects.

Public Water Agency of the Year - For the public sector organization that made the greatest contribution to meeting water supply challenges supply in 2006:

Acuamed, Spain – the Spanish government agency charged with delivering an additional 2.3 million m^3/d (608 MGD) of water to Spain's Mediterranean coast through desalination, water reuse and more efficient water management. Acuamed moved into action in the summer, releasing the first three tenders for a new generation of large desalination plants and maintaining the momentum through the rest of the year. They took the unusual step of inviting bids based on a low fixed operating cost this plus the EPC costs. This approach brought out a number of innovations from bidders to ensure that the day-to-day running cost of Spain's desalination program will be the lowest in the world.

Ministry of Water & Electricity, Saudi Arabia – the government ministry responsible for water and electricity in the Kingdom of Saudi Arabia. Since the Supreme Economic Council earmarked the water sector for privatization in 2002, the Ministry has driven a

remarkable process of reform, coming to a head in 2006 with the announcement of the timetable for its complete privatization. A national water asset-holding company is to be set up, full concession contracts will be let, and the National Water Company will move towards an initial public offering. With negligible natural water resources, under-developed water and wastewater services and a large and rapidly growing population, Saudi Arabia's water sector represents a challenge on a scale unknown anywhere else in the world. The Ministry's leadership over the past year has shown that it is up to the challenge.

Water Corporation of Western Australia – the state water utility for Western Australia, and one of the largest water service providers in the country. The Water Corporation has introduced a range of diverse and long-term initiatives including agreements with irrigators to trade water entitlements; management of catchment vegetation to increase run-off; development of new surface and groundwater sources; repurifying wastewater effluent, and an extensive range of demand management and water efficiency initiatives with government, industry and the community. Finally, Australia's first large-scale seawater desalination plant at Perth began producing water in November 2006. The Water Corporation has shown world-class leadership in water supply management in the face of a drying climate.

West Basin Municipal Water District, United States – the public water agency supplying wholesale water to cities, mutual water companies, investor-owned utilities and private companies in southwest Los Angeles County. The District has developed a three-pronged strategy for reducing the amount of water it imports and has one of the most progressive water conservation programs in the US. It also boasts the largest water recycling facility of its type in the country, producing five different qualities of recycled water for its industrial customers. They have also conducted a pilot SWRO study and are now undertaking a demonstration plant in advance of a full-scale facility to meet future water needs. West Basin's portfolio approach to securing water resources for the community it serves shows a mix of idealism and pragmatism that should serve as an example to water agencies around the world.

Innovation of the Year - For the applied process or application which shows the greatest promise in the water industry, and which was demonstrated on a pilot scale or full scale or else supported by a peer-reviewed journal:

Airlift MBR – A membrane bioreactor (MBR) in which the membranes are located external to the biological reactor. Developed by Norit and employing their X-Flow tubular UF membranes, the process withdraws mixed liquor from the aeration basin before it passes it through the 5mm diameter tubular membranes. The system operates at high flux rates and produced a high quality filtrate that can be used as RO feedwater in wastewater repurification applications. The system has an energy consumption of less than $0.25 kWh/m^3$ and the 'out-of-basin' design allows for easy expansion within a small footprint.

Intermediate distillate removal in MSF desalination - In conventional MSF operation, distillate produced in the system is re-flashed from stage to stage until it is extracted in the final stage. In this arrangement, the productivity of each stage is reduced somewhat as 18-20 percent of the heat transfer area is used to re-flash distillate rather than to produce new distillate. Leon Awerbuch and Corrado Sommariva have addressed this problem by extracting the distillate at the last stage of the heat recovery section to prevent it from re-flashing. This modification was first installed on an existing MSF unit at the Layyah plant in Sharjah, UAE, and has contributed to an increase in capacity of as much as 40 per cent. Heat extracted from the distillate may prove to be an energy source for other industrial processes, further improving energy efficiency.

Nanofiltration pretreatment for thermal desalination – The higher the top brine temperature of an MED or MSF unit, the greater its potential production capacity. Leading Edge Technologies (LET) has patented a method of pretreating a portion of the total feedwater flow with nanofiltration (NF) while the Saline Water Conversion Corp (SWCC) has developed the concept where the full feedwater flow receives NF pretreatment. LET has installed an NF system at an existing MSF facility in Sharjah to demonstrate the process. SWCC announced that it is continuing the development of its concept of using a 'tri-hybrid model' using NF as a pretreatment for RO and MED with the support of Sasakura and Japan's Water Reuse Promotion Centre. Thermal desalination is the dominant desalination technology in the Gulf region, but it is a mature technology. The use of NF pretreatment could significantly improve the process economics.

Nanocomposite Membranes – UCLA's Dr Eric Hoek developed a new thin film nanocomposite membrane that can improve membrane performance and reduce total energy requirements. The new membranes are fabricated with super-hydrophilic nanoparticles integrated in a thin film polyamide matrix on a polysulfone support layer. While water diffuses through the polyamide pores only under high applied pressure, water penetrates through the nanoparticle pores with very little applied pressure. Because the nanoparticle pore walls are even more negatively charged than the membrane surface, ion exclusion is enhanced in concert with increased water permeability. The nanoparticles also enhance fouling resistance by making the overall membrane more hydrophilic. Not only can water's permeability be increased by 75 percent, the new membrane has improved rejection characteristics.

Seawater Conversion Vessel – A pre-engineered shipboard seawater desalination system that employs unique intake and concentrate discharge systems to mitigate environmental impacts. Although shipboard desalination systems have long been discussed, Water Standard Company has developed the concept further than before and has secured several important patents. Designs of up to 189,250 m^3/d (50 MGD) per vessel are available, including power generation capabilities to eliminate access to an electric grid, and the systems are expected to ease the permitting process and eliminate the need for site specific engineering. The advantage of having a mobile system gives Water Standard unparalleled flexibility in custom designing contracts for individual or regional clients and to respond to global emergencies.

Environmental Contribution of the Year - For environmental stewardship in the water industry as exemplified by the project, process or organization that best reflects the ability to leave a small environmental footprint. Nominees are Energy Recovery, Inc (ERI); GE Water with DuPont Dordrecht; Shanghai Chemical Industry Park with Sino French Water Development; and, Tirapur India Effluent Treatment Project.

Water Reuse Project of the Year - For the water reuse project representing the most significant achievement for the industry in 2006. Nominees are the Baix Llobregat Reuse Plant, Spain; Jianxing City Water Plant, China; Palm Jumeirah MBR, Dubai; and, Reliance Jamnagar Refinery in Gujarat, India.

Louisiana

Paper mill plant gets new RO/DI

Like most paper mills, Weyerhaeuser's Red River Mill in Campti, Louisiana produces most of the steam and electrical power needed to run its linerboard operations on-site. As part of a new $183 million expansion, the mill – which produces 970,000 tons/yr of linerboard, the strong brown paper used to produce shipping boxes and other packaging – will increase generating capacity and reduce dependence on purchased energy by adding a new recovery boiler, turbine generator and steam piping system to reduce energy costs, decrease fossil fuel use and improve manufacturing costs.

Weyerhaeuser has selected Aquatech International to furnish a fully integrated water treatment system to meet boiler feedwater requirements for the expansion. The system is designed to treat 312 m^3/hr (1,373 gpm) to produce 227 m^3/hr (1,000 gpm) of demineralized boiler feedwater. It will consist of a granular media filtration system, a 3 X 50 percent BWRO system and two working lead/lag mixed bed demineralizers.

Startup is planned for the first quarter of 2008.

In Brief

US Congress is considering a bill to spur research and development into water treatment techniques that can be employed for the beneficial reuse of water used/produced in drilling natural gas and oil wells. The bill, HR902, **"The More Water and More Energy Act"** authorizes $5 million in federal grants to assist in developing three pilot plants to demonstrate the feasibility, effectiveness and safety of processes in which produced water can be recovered and made suitable for use in agriculture and to reduce water costs for businesses.

People

Maryanne Bach has left her position as director of technical resources at the Bureau of Reclamation and accepted a position working with the US House of Representatives Sciences and Technology Committee in Washington, DC. **Perry Hensley** has been named acting director of technical resources.

Jobs

Dow Water Solutions is seeking Market Development Leaders for their newly acquired UF membrane technology products. Responsibilities include providing technical and commercial support to the Dow sales force and setting and delivering regional revenue plans. Candidates should have 3-5 years UF design and application experience. Positions are based in Minneapolis, MN (job number 0602309) and Rheinmuenster, Germany (job number 0602343). Apply on-line at www.careersatdow.com

Bushnak Group is seeking a Chennai, India-based chief financial officer. Candidates for the CFO position must be chartered accountants with experience in water or power utilities and familiar with Indian legal requirements and taxes. Send queries and applications to amir@bushnak.com

Bushnak Group is seeking senior project managers, process, electrical, I&C, civil and proposal engineers with relevant experience, preferably in RO process and projects. The project manager should have experience in managing contractors and vendors for construction and commissioning of process plants and seeking projects finance. Positions are based in Jeddah, Saudi Arabia and Chennai, India. Send queries to amir@bushnak.co