

WATER DESALINATION REPORT

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Netherlands

DRINKING WITH THE WIND

A Dutch team will launch its third trial of a wind-powered desalination unit this Thursday, in Rotterdam. The 7 m³/d (1,850 GPD) unit, which will desalinate water from the River Nieuwe Maas, will be marketed by Hatendoer-Water BV, and was designed and constructed in cooperation with TU Delft, NieuweWeme Technische and Fortis Wind Energy.

The system is fully self-contained within a 3m (10 ft) container, which weighs 2,500kg (5,500 lbs) and includes a windmill and solar panels to power the unit. Peter Williams, of Hatendoer-Water, told *WDR* that the windmill will generate most of the 6,000 Wh of required power, although two solar panels on the container's roof will also be used to recharge the battery from which the RO unit is operated.



Windmill-powered RO

Units can desalinate brackish or seawater, and prototypes have been operated in Delft, Netherlands and Curaçao.

A fully outfitted unit will cost less than €70,000 (\$103,100).

California

SAN DIEGO WILL TAKE ANOTHER LOOK AT REUSE

In August, the Coastal Commission denied San Diego's Point Loma Wastewater Plant a five-year waiver from having to meet secondary treatment levels for the effluent it discharges to the ocean. Last week, the Commission reversed itself by a vote of 8 to 4, granting the waiver and saving the city an estimated \$1.5 billion to upgrade the plant.

Point Loma currently treats 175 MGD of municipal wastewater to primary effluent standards before discharging it 4.5 miles (7.2km) offshore and 320 feet (98m) below the ocean's surface. The waiver means that San Diego remains the only California city that does not treat wastewater to secondary standards before discharging to the ocean.

Surfrider Foundation and Coastkeeper have opposed the wastewater discharge for more than ten years and sued the City multiple times over the issue. However, both groups supported the waiver this time after negotiating an agreement

that would have the City conduct a \$2 million study to maximize water reuse and minimize future ocean discharges. That study – plus an \$11.5 million IPR demo project – are evidence of the City's efforts to increase beneficial use of recycled water and reduce flows to Point Loma.

The waiver was granted on the condition that the City would report back in two years on the status of studies.

Caribbean

THINGS GET NASTY IN BVI

Animosity is reaching new heights (or depths?) between two British Virgin Islands (BVI) water providers. Ocean Conversion (OC) – Consolidated Water's (CWCO) local affiliate – has been the primary supplier of potable water to the BVI Government for more than 19 years. However, Biwater appears to be doing everything it can to change that.

As *WDR* reported last week, a Supreme Court ruling handed over the ownership of the 1.7 MGD (6,434 m³/d) Baughers Bay SWRO plant to the Government for an interim, \$5 million payment. OC will also get a yet-to-be-decided settlement for water delivered from December 2007 to the present, an amount that OC calculates at \$13.7 million plus \$4.7 million in interest.

Meanwhile, the UK's Biwater has submitted a proposal to the BVI Premier in which it proposes to build a new 2.76 MGD (10,446 m³/d) SWRO plant at Paraquita Bay that would supply water at what the company claims is a fraction of the price currently being charged by OC.

A Biwater spokesperson told *WDR*, "We were introduced to the BVI opportunity by a New York water asset management fund, and were intrigued to find that Tortola [the largest BVI island] had not only one of the world's highest costs for desalinated water at \$20.28/kgal [\$5.36/m³], but they also had one of the world's highest non-revenue water losses at 81 percent."

Seeing an opportunity, Biwater undertook an engineering evaluation of the island's water supply options and submitted a proposal for the new plant at a price that it said is one-third

IDA World Congress Update

The advance program and general schedule for the IDA World Congress to be held from 7–12 November in Dubai is now available at www.idadesal.org.

The IDA Young Leaders Program (YLP) – available to IDA members 33 years of age or younger – will hold a reception on 8 November at the Atlantis' Palm Grove.



Why is Ocean Conversion going to the Caucus this Tuesday to ask for even more handouts? They have already been gifted, WITHOUT COMPETITION, Bar Bay at 200% of Biwater's price which will give them a net profit of \$6.83 per 1,000 gallons. Their website claims the plant can provide up to one million gallons a day which means they will eventually cream off, from the Government, and therefore the householders of the BVI, a net profit of \$3 million each year. The few voting shareholders will receive the vast majority of this profit to fund their hotel, property developments and marinas at the expense of the little man.

One of the Biwater advertisements appearing in the BVI press

of the price currently being paid. The Biwater offer includes a new SWRO plant with full post-treatment, two new wastewater treatment plants, new sewage pumping stations, new mains, a new reservoir at the highest point on the island, repairs of the existing reservoir, a full non-revenue (i.e. leak) reduction program and a new mapping and billing system with full census of every property on the Island.

Under the program, Biwater's 25-year potable water price would be \$5.71/kgal (\$1.51/m³) excluding electricity which will be provided by the BVI government at no cost to Biwater, plus an additional \$5.04/kgal (\$1.33/m³) for 10 years to cover the capital cost of the new wastewater treatment equipment.

Biwater said, "Our non-revenue reduction program will save the government over \$4 million per year and they declared our total, 25-year savings for our entire program at \$272 million. This is an offer that has been reviewed by the UK law firm of Eversheds and Arup, a government-appointed consultant. The Biwater proposals have undergone a terms and conditions review and a thorough 'value for money' check, and all parties have agreed to their acceptability."

The company said that it expects its proposed Water Purchase Agreement to be signed by the end of the month.

OC has responded by meeting with a Premier-led Government Caucus last Tuesday, and submitting an alternative proposal, which OC said is superior to that put forward by Biwater and provides substantial savings to Government. OC also raised questions regarding Biwater's capital cost of \$45 million for its proposal package versus OC's estimated cost of less than \$28 million for the additional desalination capacity, wastewater treatment equipment and non-revenue water reduction services.

An OC spokesman said that Biwater has been purposely understating the energy efficiency of its proposed desal plant to make its pricing more attractive, citing that Biwater's alleged cost of \$2.52/kgal (\$0.66/m³) for electrical power, which the Government is responsible for paying, translates at the current electrical rate of \$0.26/kWhr, into unrealistically low energy efficiencies (9.69 kWhr/kgal; 2.58 kWhr/m³) for

a beach well-fed SWRO plant with full product water remineralization and pumping. OC believes that the real cost of electrical power for the Biwater plant will add anywhere from \$0.72/kgal (\$0.19/m³) to \$1.98/kgal (\$0.52/m³) to the cost that the BVI government would ultimately pay for water, depending on which energy recovery system Biwater has priced into its design, which has so far not been disclosed.

Both companies are airing their arguments in the press using inflammatory rhetoric, advertisements and press releases, and accuse each other of appropriating the others' ideas.

OC has said that Biwater is misinformed and is posting misleading statements online to confuse people about its "less than stellar record of operation around the world," while Biwater has taken out paid advertisements saying that OC "is trying to play the 'we are local' card" while only the voting shareholders not "the little man" receive the profits, and it is "ethically and morally wrong that such high prices and profits should be awarded to so few, by Government, at the expense of so many."

Stay tuned.

Note: Water volumes in the BVI and much of the Caribbean are usually reported in imperial gallons, with 1 imperial gallon = 1.2 US gallon. All 'gallon' units in this story are US gallons.

Utah BWRO BID OPENING

Bids for the Jordan Valley Water Conservancy District's 6.96 MGD (26,343 m³/d) Southwest Groundwater Treatment Plant in West Jordan were opened last week. Harn R/O Systems was the low bidder for the RO treatment system with a bid price of \$3,207,146, and Flatiron Construction was the low bidder for the balance of the plant, which includes the post-treatment facilities, supply wells, concentrate disposal system and pipelines at a price of \$23,665,433.

Carollo Engineers' Tom Seacord is serving as the District's engineer and described the project to *WDR*. "The RO system will consist of two separate systems to treat two different aquifers. A two-train, 3.85 MGD (14,572 m³/d) RO will treat the deep aquifer with an 1,800 mg/L TDS and a single-train, 1.96 MGD system will treat the shallow aquifer with an 1,100 mg/L TDS. The systems must remain independent because the shallow aquifer is under the influence of the Jordan River," he said.

Groundwater sulfate concentrations of over 500 mg/L are the result of contamination by a Kennecott Utah Copper mining operation. After the State of Utah filed natural resource damages against Kennecott, the US District Court issued a consent decree in August 1995 under which Kennecott agreed to an initial cash settlement and letter of credit now valued at approximately \$75 million.

The amount is expected to cover the cost of the project and concentrate pipeline, a future expansion to 14 MGD (52,990 m³/d) and 40 years of plant operation.

Bids for the 26-mile (42km) pipeline to transport RO concentrate to the Great Salt Lake are due later this year, and the date for ‘substantial project completion’ has been moved forward from January 2012 to November 2011.

India

PERFORMANCE TESTS UNDERWAY

Last November, while the Minjur desalination plant was still under construction, Cyclone Nisha battered the Tamil Nadu coast, in southeast India. The rough weather destroyed a 200m (656 ft) long cofferdam erected to facilitate installation of the transition pipes from the 100 ML/d (26.4 MGD) SWRO plant to the offshore intake and outfall.

The Rs 510-crore (\$110 million) plant – executed as a BOOT contract by a Befesa/IVRCL consortium for the Chennai Metro Water Supply and Sewerage Board (CMWSSB) – had been scheduled for a January start-up, but had to be delayed until a new intake and discharge could be built.

On Friday, Carlos Cosin, Befesa’s managing director, told *WDR*, “A provisional intake is in place and the plant has been operated at full capacity. We are now waiting for the order to begin a four-day performance test prior to beginning commercial operation.”

The offshore portion of the intake and outfall pipelines will consist of 1,600mm (63 in) diameter GRP pipes laid in trenches below the seabed, extending 600m (2,000 ft) offshore. The outfall’s terminus will be fitted with multiple diffusers, and the intake will have a coarse bar rack.

According to the bulk water purchase, CMWSSB will purchase the desalinated water at a cost of Rs 48.66/m³ (\$1.03/m³; \$3.90/kgal) and will supply to industries at a rate of Rs 60/m³ (\$1.27/m³; \$4.81/kgal).

Technology

EVAPORATION SYSTEM REDUCES POND SIZE

Concentrate disposal is often the Achilles heel of inland desalination projects. Inland sites have inherently more limitations that may result in a project proving to be economically or environmentally unfeasible.

Because of its relative operating simplicity, a properly constructed evaporation pond is usually the first and most obvious alternative. Unfortunately, high land costs and low evaporation rates often may make this an impractical option. However, an enhanced evaporation system being commercialized by Lesico CleanTech may dramatically reduce the surface area required for an evaporation pond.

The WAIV (Wind Aided Intensified eVaporation) system consists of flexible, vertical plastic strips supported by a 4m (13 ft) tall frame. A pump delivers RO concentrate to a distribution network located above the frame, which evenly distributes the concentrate over the top of the strips. As a thin film of liquid runs down the surface of the strips, wind blowing through the unit enhances evaporation by 15 times more than a conventional evaporation pond. The wind also helps slough off built-up salt cake from the plastic strips.

Nissam Asaf, the CEO of the Israel-based company, told *WDR*, “We are now installing a WAIV pilot unit at Mekorot’s Ketziot desalination facility and will begin testing in December. Currently, the BWRO plant employs 300,000m² (74 acres) of evaporation ponds to treat nearly 1,200 m³/d (0.32 MGD) of brine. We expect the effective WAIV footprint will require only 10 percent of this area.”

He said that the system footprint includes the WAIV modules, which require up to 160 m² (1,700 ft²) each with an effective surface area of 30 m²/m², an auxiliary feed pond, access area and auxiliary facilities.

Asaf said that a demonstration WAIV system is currently



WAIV Modules

NaCl Salt Cake on Plastic Elements

treating 130 m³/d (34,350 GPD) of BWRO concentrate at a General Motors plant in Ramos Arizpe, Mexico. Another unit is currently being tested in an Australian vineyard where a 100 m³/d (26,420 GPD) saline waste stream requires 60,000 m² (15 acres) of conventional pond area.

The patented technology was developed in conjunction with Ben Gurion University’s Institute for Applied Research, and some of the initial research work was funded by the Middle East Desalination Research Center (MEDRC).

California

RESORT’S DESAL PLANT WINS AWARD

When a new 18-hole golf course increased the water needs of the Cache Creek Casino Resort, the Resort’s owner – Northern California’s Yocha Dehe Wintun Nation Indian Tribe – turned to HydroScience Engineers for a sustainable solution. The result was selected as this year’s recipient of the WateReuse Foundation’s Desalination Plant of Year.

HydroScience's Jason Brabec told *WDR* that the resort had relied on an ion exchange softening of its potable water. However, the regenerant resulted in an increased salt concentration in the facility's wastewater, which would cause difficulties if the treated effluent were to be reused on the golf course. "We decided the better approach was to treat the groundwater first, eliminate the ion exchange system, and preemptively remove the salt," he said.

Although the groundwater is very hard with high silica concentrations, Brabec said that a GE Water electro dialysis-reversal (EDR) unit was able to meet the potable water quality requirements and still operate at an 85 percent recovery. Each of the four EDR trains consist of three stacks, and the water is pH-adjusted and chlorinated prior to distribution.

Faced with limited concentrate disposal options, HydroScience selected a New Logic VSEP System to treat the EDR concentrate. The VSEP system uses a membrane filter pack with vigorously vibrating elements to prevent fouling, while concentrating solids and operating at a 90 percent recovery. The reduced brine volume is then trucked to a regional facility for final disposal.

The entire system, which was commissioned in April, operates at a recovery of over 94 percent and has a footprint of less than 8,500 ft² (790 m²).

Trinidad

SWRO PLANT PROBLEMS RESOLVED

After an extended shutdown for repairs, a 100,000 GPD (380 m³/d) SWRO plant at Moruga, on Trinidad's south coast, is back in operation. The plant was commissioned in August 2008, and was constructed by Hankook Jungsoo Industries (HaJI) of Korea. It is the first of several similar plants planned by the Water and Sewerage Authority (WASA) for rural coastal communities on the island.

A plant operator contacted by *WDR* said that the plant had undergone numerous power interruptions that led to electrical failures of the VFD drive. In addition, piping problems associated with threaded plastic piping and pipe caps on the UF pretreatment system are understood to have caused the unit to be shut down. The plastic components have now been replaced, and the system is now operating satisfactorily.

IN BRIEF

Energy Recovery, Inc (ERI) has announced that it has been awarded the order to supply its PX energy recovery devices for the 50 GL/yr (36.2 MGD) Southern Seawater Desalination Plant (SSDP), south of Perth, Australia. The

project is being constructed for the Water Corporation by Southern SeaWater Alliance – a consortium that includes Tecnicas Reunidas, Valoriza Agua, A J Lucas and Worley Parsons. The project will be the fourth large-scale SWRO in Australia to use the ERI technology.

WDR has learned that the \$2.2 billion **Shuweihat 2 IWPP** in Abu Dhabi should reach financial closure by the end of this week. The plant will employ six **Doosan** MSF evaporators, valued at \$800 million, to produce 459,000 m³/d (121.3 MGD) of water. At least two of the evaporators have already been shipped. GDF Suez developed the IWPP project and will sell water to Abu Dhabi Water and Electricity Authority (ADWEA) at a price of \$1.13/m³ (\$4.92/kgal).

Schlumberger Water Services is drilling test wells at WEB Aruba's Balashi desalination site to investigate the reliability and water quality of an alternative intake arrangement for a 24,000 m³/d (6.3 MGD) expansion. *WDR* understands that up to 4 of 13 prequalified bidders have now been short-listed to submit firm offers for the new SWRO, which will join an existing 8,000 m³/d (2.1 MGD) SWRO commissioned in March 2008.

Ecolutia Services, the services provider of the Stulz Hager+Elsässer Group, has expanded its mobile water treatment options to include the Proteus series of mobile, skid-mounted or containerized treatment systems for softening, filtration, demineralization, condensate polishing and de-oxygenation with production rates of up to 7,200 m³/d (1.9 MGD). The company also offers mobile BWRO and SWRO systems.

The **Southwest Membrane Operator Association** (SWMOA) will hold a hands-on operator training workshop in Ventura, California at the City's Water Treatment Plant on 4 November. More information is available at www.swmoa.org.

PEOPLE

Consolidated Water (CWCO) chairman and board member **Jeff Parker** has resigned. He has been with the firm for 29 years, and had been the company's CEO from 1994 to 2004. The company expects to appoint a new chairman at its November board meeting.

On 18 October, after 26 years of service **Jossy Laclé** will retire as the managing director of Water-En Energiebedrijf Aruba NV (WEB), the company responsible for the island's water and power supply. He will be replaced **Oslin J. (OJ) Boekhoudt**, formerly of Valero Energy Refinery.