

WATER DESALINATION REPORT

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Florida

OLDEST US SWRO TO BE REHABILITATED

Last week, Florida's governor announced that the Florida Keys Aqueduct Authority (FKAA)—which bills itself as “Delivering Quality Water to Paradise”—would be able to continue its mission, despite damage caused by Hurricane Irma in 2017. Under its Rebuild Florida Infrastructure Repair Program, the state would provide \$30.7 million to rehabilitate and improve FKAA's Stock Island SWRO facility.

The Stock Island plant was originally commissioned as a 3 MGD (11,355 m³/d) facility in January 1981. After 18 months of operation, the plant was placed in standby operation, and 1 MGD (3,785 m³/d) of the plant's capacity was relocated to Marathon, Florida. The plant was last rehabilitated and upgraded in the 1990s. In 2007, water produced from the Stock Island plant won a statewide taste test.

Both plants remain in hot standby and are available for emergency operation.

Stock Island currently has two SWRO supply wells, and earlier last month, issued an Invitation to Bid to contractors interested in constructing up to four more 100 foot (30m) deep supply wells. Bids are due on 12 February.

Australia

SYDNEY'S INSURANCE POLICY PAYS OFF

After the 250,000 m³/d (66 MGD) Sydney Desalination Plant (SDP) was commissioned in early 2010, it went on to successfully supply up to 15 percent of the city's water for the next two years. However, record rainfall filled the area dams, and the plant was mothballed in July 2012. New operating rules were put in place that would only allow an SDP restart if the storage capacity fell below a trigger level of 60 percent.

Since 2017, the state of New South Wales (NSW) has been gripped by its worst drought on record, with Sydney experiencing its longest sustained and fastest rate of water depletion on record. WaterNSW, the operator of the state's rivers and water supply, now calls the drought “the most prominent issue of our times.”

When storage fell below the trigger level in late January 2019, the order was given to restart the SDP, and by early June, it was operating at 50 percent of its production capacity. Even with the addition of the desalinated water, Level 1 water restrictions were also put in place. By early August, the SDP was fully operational, although water storage levels had dropped below 45 percent, triggering implementation of Level 2 water restrictions and the start of detailed design work on an expansion that will double the production of the SDP to 500,000 m³/d (132 MGD).

Late last week, with storage levels dipping below 42 percent, Emma Johnston, University of New South Wales' Dean of Science, told *WDR* that the prognosis does not look good. According to Professor Johnston, long-term climate projections promise further declines in critical winter rainfall for southern Australia.

“In addition, our population is increasing and recent per capita water usage rates have actually increased. And now, there is a new threat: the increased risk, severity and extent of bushfires in Australia as a result of climate change,” she explained.

“An enormous amount of ash and debris has built up in water catchment areas as a result of the fires. Our declining supply of fresh water has inevitably suffered some form of contamination, and this will only get worse when the first decent rains fall.

“Compounding matters, the bushfires have destroyed much of the river-side vegetation, which acts as a barrier to erosion, meaning run-off and sedimentation will increase.

“This combination of factors has very serious potential consequences for our drinking water, as the rapid increase in nutrients, trace metals and suspended sediments can cause

Next week in Houston: Produced Water Seminar

The Produced Water Society will hold its 30th Annual Seminar in Houston, Texas, at the Westin Memorial City Hotel on 11-13 February. For details, visit www.producedwaterevents.com/pws-seminar-2020/.

prolonged algal blooms and low oxygen conditions. This can also result in much larger than normal amounts of trace metals and odorous chemicals, such as methane, ammonia and sulfide.”

Johnston was part of a team of scientists commissioned by Sydney Water to conduct an independent, world-class ecological impact assessment of the discharge of the SDP’s concentrate on fish and marine invertebrates.*

“The results of our studies are fascinating, and turn the threat paradigm on its head. Rather than higher salt levels having a toxic impact, as once thought, a surprising finding was that many invertebrate and reef fish populations actually increased while the plant was discharging concentrate. This was likely caused by increased flow rates around the diffusers. So the industry needs to trade off the desire for rapid dilution with potential impacts from changes to flow,” said Johnston.

“Australia has an enormous coastline and we can afford to do desalination well. We should use our cutting-edge technology and high environmental standards, along with our renowned research capability, to help the world maximize the benefits and minimize the impacts from this particular form of critical resource supply.

“Big cities, regional centers and small hamlets are all going to need more sources of potable water.”

**Editor’s note:* The journal papers presenting the results of Professor Johnston’s research at the SDP are available at <https://tinyurl.com/y8sg5j4r> and <https://tinyurl.com/snledqh>.

Global Water Summit

TECHNOLOGY IDOL LINE-UP SET

For the past twelve years, GWI’s Global Water Summit has included a showcase event that introduces five of the newest and most interesting desalination technologies. This year’s Technology Idol event will be held during the upcoming Summit in Madrid, Spain, on Monday, 30 March.

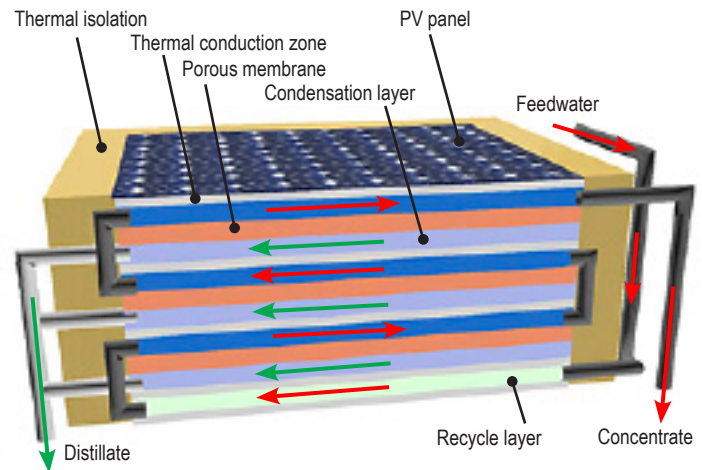
Each participant will give a 10-minute presentation on their technology, after which, a panel of judges will question the participants. This year’s participating presenters and technologies are:

KAUST – Saudi Arabia

Presenter: Professor Peng Wang

Technology: *PV-MSMD Desalination* – A process that simultaneously produces fresh water and electricity via multistage membrane distillation (MSMD) and an integrated

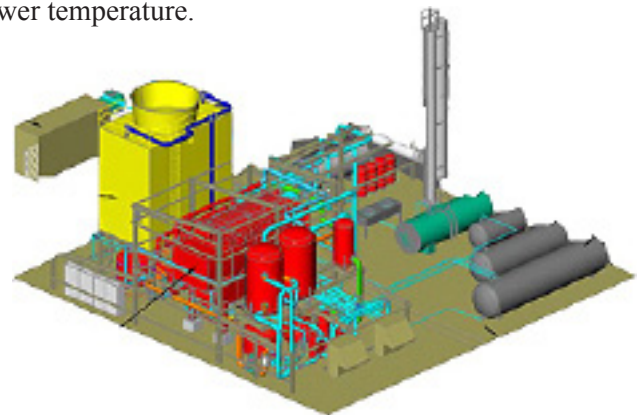
solar photovoltaic panel. The process, which was developed by a team from King Abdullah University of Science and Technology (KAUST), has the potential to transform a conventional power plant from a huge water consumer to an electricity plus clean water co-producer.



Northumbrian University – Newcastle upon Tyne, UK

Presenter: Professor Muhammad Wakil Shahzad

Technology: *Hybrid MEDAD Desalination* – A hybrid sea-water desalination process that combines an adsorption cycle with a conventional multi-effect distillation (MED) system to lower the top operating temperature to as low as 10°C (50°F) to boost water production, and employ solar. The cycle integration is achieved by extracting vapor emanating from last effect of the MED by an adsorption (AD) cycle to accommodate additional condensation-evaporation at a lower temperature.



Sidem-Veolia – Paris, France

Presenter: Vincent Baujat, CEO

Technology: *The Barrel SWRO* – A plug-and-play approach to seawater RO, which uses a large-diameter carbon steel vessel that is factory assembled and may contain over 200 RO membrane elements, each of which is equipped

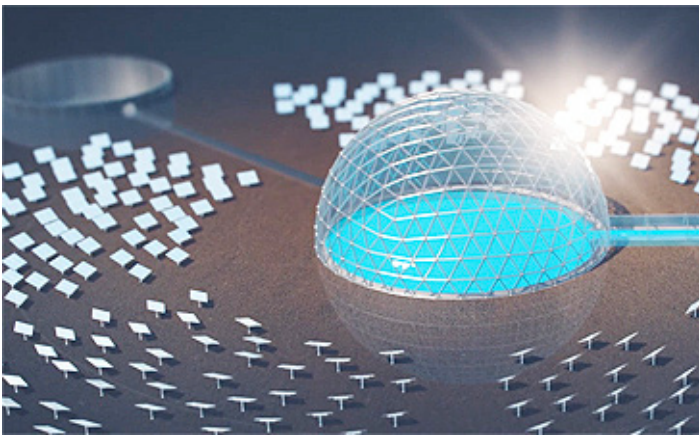
with a digital sensor to enable operator monitoring. The arrangement allows for outdoor operation and a reduction in plant footprint.



Solar Water Plc – London, England

Presenter: David Reavley, CEO

Technology: *Solar Dome* – Fresh water is produced by evaporating a continuous flow of seawater fed into a geodesic dome constructed of steel and glass that measures up to 120m (394 ft) in diameter. Parabolic mirrors concentrate solar radiation on the dome's structure, where it is conducted down to the lower dome to boiler the seawater. The resulting vapor is condensed as fresh water, while the brine is removed from the bottom of the dome.

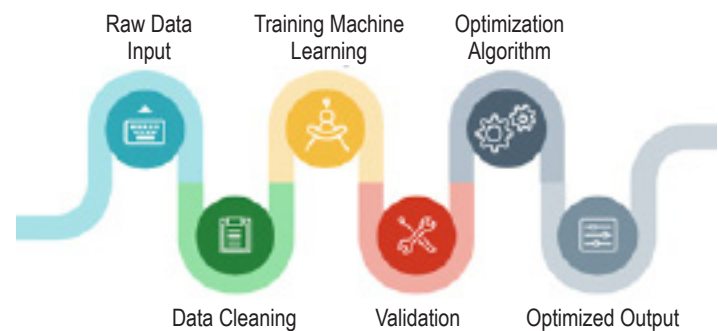


Synauta – Calgary, Canada

Presenter: Mike Dixon, CEO

Technology: *Desal Software-as-a-Service* – A secure, easy-to-deploy machine learning software package that yields desal plant energy savings. Using algorithms tailored to best predict efficiencies for a given plant, Synauta collaborates with operators to collect the correct data, and deliver a process equipment and instrumentation analysis. Plant flows are manipulated to ensure performance goals are met at a

minimum energy input. Following an assessment phase, operators control inputs, and software is integrated with the plant SCADA system.



Energy

A NEW LOW FOR SOLAR POWER

A Total-Marubeni consortium has been selected to build the 800 MW Al-Kharsaah Solar PV power plant in Qatar. The plant will produce electricity for a levelized cost of water of \$0.01567/kWh, which is a new world record low price for solar power. The CapEx for the 10 km² (3.9 mi²) facility is estimated at \$467 million. The first phase of the project will be online in the first quarter of 2021, and the entire plant will be operational in early 2022.

In his weekly briefing last week, GWI Publisher Christopher Gasson noted, “Energy is the medium for climate change mitigation. Water is the medium for climate change adaptation. Low-cost solar PV creates the opportunity for arbitrage between the two. We can use power to reduce the impact of climate change on the water cycle without making climate change worse at the same time.

“Minimizing energy bills has thus been a big consideration in infrastructure design. Low-cost PV could reverse that logic.”

Technology

DIGITAL DESAL STARTUP RECEIVES GRANT

Calgary-based Synauta, a cleantech startup that provides machine learning technology for desalination plants, said it will receive a \$1.2 million investment from Sustainable Development Technology Canada (SDTC). An arm's-length foundation created by the Canadian government, SDTC supports companies with the potential to become leaders as they develop and demonstrate new technologies that help to tackle climate change, create new opportunities and build a more sustainable future.

Synauta CEO Mike Dixon, who will present the company's Software-as-a-Service offering for desalination plants in next month's Technology Idol event (see story, page 2), told *WDR*, "We're delighted to work with the team at SDTC and our four consortium partners to deliver a powerful, user-centric solution that will address growing water scarcity, and apply new technology to reduce the amount of energy and chemicals required to produce desalinated water."

Company News

DESALTER IS OFF TO A FAST START

Last week, *WDR* announced that Aquatech Systems Asia had partnered with India's Shapoorji Pallonji Group to win four SWRO projects for Gujarat Water Infrastructure Ltd (GWIL). Following the release of the issue, Devesh Sharma, the managing director of Pennsylvania-based Aquatech International, called to clarify that Aquatech Systems Asia is the company's wholly-owned Indian subsidiary.

Sharma also noted that those four projects weren't the company's only successes since the new year, adding, "I'm happy to report that besides the 270,000 m³/d [71.3 MGD] worth of wins in India reported last week, Aquatech has also been recently awarded two additional SWRO projects with close to 130,000 m³/d [34.4 MGD] of production capacity.

"Working with Bechtel, we will supply a 34,000 m³/d [9 MGD] SWRO for Antofagasta Minerales' Los Pelambres Mine in Chile, and a 100,000 m³/d [26.4 MGD] SWRO for Pertamina's RDMP refinery in Indonesia. We're excited to start the year with such a healthy backlog, and look forward to continuing to add to our list of 2020 successes."

IN BRIEF

MODEC, a Japan-based provider of floating solutions for the offshore oil and gas industry, has awarded Veolia Water Technologies' **VWS Westgarth**, its Scotland-based subsidiary, a contract to supply a seawater sulfate removal system (SRS) for the Almirante Barroso MV32, a floating production storage and offloading vessel (FPSO). The 280,200 bbl/d (44,450 m³/d) SRS includes coarse strainers, a UF pretreatment system, high-pressure pumps, NF membranes, a CIP system, vacuum deaerator, water injection pumps and plant controls. The FPSO will be deployed at the Buzios oilfield, offshore Brazil in a water depth of 1,900m (6,234 ft) deep water.

Consolidated Water Company (CWCO) announced that it has acquired the remaining 49 percent interest in Aerex Industries, a Florida-based designer and manufacturer of water treatment equipment including MF/UF and RO systems. CWCO had acquired 51 percent ownership of the company in February 2016. The company also reports that based upon an initial assessment, it suffered no major damage to its plants, equipment and distribution systems in the Caribbean as a result of last week's 7.7 magnitude earthquake and the 6.1 magnitude aftershock.

Several towns along the Barwon-Darling River system in northern New South Wales (NSW), Australia, are turning to **mobile BWRO plants** as the region's drought continues. The outback town of Brewarrina, has reportedly borrowed a 70 m³/d (18,500 gpd) desal plant from Tenterfield. Meanwhile, the NSW government is spending A\$10 million (\$6.7 million) to install similar plants at Bourke and Walgett, and additional plants are being considered for coastal communities, including Forster.

WateReuse Florida will hold a webinar on **Developing Regulatory Frameworks for Potable Reuse** on 5 February from 2:00–3:00 PM EST. Jacobs' Larry Schimmoller and the City of Plant City's Lynn Spivey will present. For information, visit <https://tinyurl.com/wkoznst>.

California's Coastal Commission's staff has recommended that CalAm Water withdraw and resubmit the coastal development permit application for its proposed 6.4 MGD (24,225 m³/d) SWRO plant, which is a key element of its **Monterey Peninsula Water Supply Project**. The request is based on the fact that the Commission's staff requires extra time to further evaluate the project's impact. It appears that the earliest that CalAm's application could be considered is September. The delay probably means that the project will not be completed in time to meet the 31 December 2021 deadline required to cut back withdrawals from the Carmel River.

PEOPLE

Harold Fravel has retired as the executive director of AMTA at the end of 2019. Previously, he worked for Dow Chemical for 36 years. He is available to assist with membrane projects, training or other special projects. He remains based in Florida, and may be contacted at haroldfravel@gmail.com.