Water Desalination Report

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UAE

Financial close for $0.36/m³ desalted water

ACWA Power said it has reached financial close on the funding for the 818,280 m³/d (216 MGD) Hassyan Independent Water Project (IWP) project in Dubai. The Saudi-based developer, who has an effective shareholding of 20.4% in project company, had signed a water purchase agreement (WPA) with Dubai Electricity and Water Authority (DEWA) in October 2023, to deliver water at a record low price of $0.36536/m³ ($1.38/kgal).

The SAR 2.76 billion ($738 million) debt component was supplied by a mix of local and international commercial lenders for a period of 32.5 years. The Saudi ExIm bank reportedly funded $75 million to enable Saudi content in the project. The Hassyan project was the first major privately financed water project in the emirate.

ACWA Power announced that the EPC contractor will consist of a team that includes Veolia-Sidem and SEPCOIII Electric Power Construction. Other client advisors are Deloitte (financial), WSP (technical), and Addleshaw Goddard (legal).

The SWRO project will be powered by renewable PV solar energy from the Mohammed bin Rashid Al Maktoum Solar Park, which is the largest single-site solar park in the world, and has been developed using the Independent Power Producer (IPP) model.

The Hassyan IWP is expected to become operational, in phases, in 2025 and 2026.

Israel

20-yr old SWRO to be upgraded/expanded

When it was commissioned by an IDE-Veolia-Elran consortium in 2005, the 330,000 m³/d (87.2 MGD) Ashkelon project in Isael was one of the largest seawater desalination plants in the world, and the largest SWRO plant. With a water price of $0.527/m³ ($2.00/kgal), it was also the lowest priced water produced by any seawater desal plant.

In 2010, the facility was expanded to its current production capacity of 396,000 m³/d (104.6 MGD).

Last week, Israel's Ministry of Energy's Inter-Ministerial Tender Committee issued an invitation for private entities and joint ventures to participate in a pre-qualification process to build, operate and transfer (BOT) an upgrade and expansion of the existing Ashkelon SWRO facility to a final production of approximately 790,000 m³/d (208 MGD).

The two-phase competitive selection process includes a pre-qualification process and a tender process, in which eligible pre-qualified entities may participate.

The deadline for pre-qualification submissions is 16 May 2024. For more information on the prequalification process, visit https://mr.gov.il/ilgstorefront/en/p/4000583202.

Editor's note: Plant capacities stated above are representative of daily production capacities, which are usually more familiar than the annual values used in the tender documents.

Texas

City hosts SWRO project contractors

Over 250 people from 150 different firms attended last Thursday's Contractor Engagement Day to be briefed on the city's plans to build a 30 MGD (113,550 m³/d) SWRO plant at a 14-acre site on the south shore of Corpus Christi Bay's Inner Harbor Ship Channel. City Manager Peter Zanoni welcomed the attendees and outlined the city's role as the primary water supplier to a seven-county area, and described its current water supply challenges.

Drew Molly, Corpus Christi Water's COO, then provided a project overview and described the work that has been done to get the project to the point that they were ready to begin contractor discussions. Josh Chronley, the city's chief procurement officer, also outlined the timeline and described the progressive design-build contracting model that is planned for the project.

The water rights authorization through the Texas Commission on Environmental Quality (TCEQ) has been secured, and the Texas Pollutant Discharge Elimination System (TPDES) permit has been drafted by TCEQ. A permit-related public hearing will be held in April 2024. The US Army Corps of

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Engineers application has been administratively approved and posted for public notice.

Funding is expected to be provided through a combination of low-interest loans from the Texas Water Development Board, the city's water supply development funds and, revenue bonds, if needed. Grant funding is also being pursued through the Bureau of Reclamation.

A request for qualifications (RFQ) will be released in late March or early April, with a request for proposals (RFP) expected to be sent to 3-5 shortlisted teams in July. The project is planned for completion in late 2027 or early 2028.

Freese and Nichols, Inc. (FNI) will serve as the owner's advisor, with WSP USA and Carollo Engineers, serving as key advisory team members. It is understood that a pilot study will be initially conducted under the existing FNI contract, but will be transitioned to the design-build contractor once the firm is selected. Piloting input will be received from the short-listed RFQ respondents during the RFP-stage and incorporated into the initial piloting efforts by FNI.

Following a brief question and answer session, the 45-minute presentation portion of the program was concluded, and the city's team held a series of one-on-one meetings with prospective contractor teams, while the rest of the attendees networked with potential project partners, and chatted with the mayor, city staffers, and some of its consultants who were not in the individual meetings.

For many of the standing-room-only crowd, last week's event legitimized the city's intention to move ahead with seawater desalination sooner, rather than later. The city had to have been pleased with the level of interest in the project, and Molly told *WDR*, "Judging from the overwhelming turn out today, it is clear that the contractor community from around the world is eager to play a major role in helping the City of Corpus Christi develop a new sustainable water supply.

"The city appreciates the energy and excitement from all who attended the Contractor Engagement Day. We know the prosperity of the region and the economic vitality of Texas rests in the hands of those who responsibly and successfully utilize seawater desalination as a viable source of drinking water."

California

HIGH-RECOVERY RO RETROFIT NEARS COMPLETION

Approximately 75 percent of Santa Monica's water supply is provided by local groundwater, and the remaining 25 percent is supplied with imported water purchased from the

Metropolitan Water District of Southern California (MWD). As part of its program to become water self-sufficient, the City of Santa Monica is now upgrading its Arcadia WTP to increase the BWRO system's recovery to 90% using ROTEC's Flow Reversal RO (FR-RO) technology.

FR-RO is a variation of the conventional RO system in which the direction of the feed/brine flow within the pressure vessels is periodically reversed. The result is that the last, or tail element in the final stage is periodically reversed, and becomes the first, or lead element in the first stage until the next reversal is initiated.

Because scaling is most likely to occur in the tail element, where the solute concentration is highest, the reversal process mitigates scaling by eliminating the scaling environment before the scale has time to form. Even if scale formation may have begun, the flow reversal introduces the more dilute feedwater, which can have a 'cleaning' effect, flushing the membrane surface before the scale induction time has had a chance to repeat the scale formation cycle.

Flow reversal is achieved by adding a set of valves, controls and a PLC automation package to a conventional RO, which means that it is possible to retrofit existing systems. If feedwater conditions change, or a 'fallback position' is preferred, it is possible to stop the valve cycling, and allow the system to operate conventionally.

According to Bruce Alderman, the CEO of Rotec USA, the four existing three-stage RO trains at the Arcadia WTP were initially designed for operation at up to about 80% recovery. However, a successful 2020 pilot study—during which side-by-side tests were simultaneously conducted on Rotec's FR-RO process and another supplier's closed-circuit RO (CCRO) process—demonstrated that an FR-RO retrofit of the four existing trains was the most cost-effective solution to increase production.

Valves (orange) installed on existing RO during ROTEC FR-RO retrofit

Last week, Alderman told *WDR* that retrofits of three of the four trains have been completed, and the units are now operational. The final train is expected to be in operation by the end of this month.

Editor's note: ROTEC USA was established in 2023 as a subsidiary to Israel-based ROTEC Ltd. to provide sales and service in North America. Its technology had previously been offered through independent OEMs. Though the company now offers its systems directly, it continues to work with engineering firms, contractors, and OEMs to provide designs and licenses for its technology on specific projects, and for certain applications.

Innovation

XPRIZE FOR DESAL LAUNCHED

One of the tenets of the XPrize Foundation is, "Without a target, you'll miss every time." Last week, the organization—an international non-profit that designs and hosts public competitions intended to encourage technological development—hung out a big target for desalters: a $119 million prize purse for novel seawater desalination technologies that will be reliable, affordable, and sustainable, and increase access to clean water.

Made possible by an investment from the UAE's Mohamed bin Zayed Water Initiative, the 5-year XPrize Water Scarcity global competition is designed to drive widespread access to clean water by creating reliable, sustainable, and affordable seawater desalination solutions. Competing teams will develop technologies that can responsibly expand access to the water contained in Earth's seas and oceans.

There are two prize tracks for the desalination prize:

- *$70 million Track A: The New Desalination System* – The winning team will reliably and most sustainably generate 1,000 m^3/d (264,200 GPD) from seawater at the lowest cost, below a target benchmark to ensure global accessibility, over the course of one-year.
    - $20 million Moonshot Awards
- *$9.5 million Track B: Novel Membrane Materials* – The winning team will most sustainably and cost-

effectively treat seawater to potable water quality using RO membranes, demonstrating an operational lifetime of 10 years or more.

By implementing these advancements, the way is paved for a water-secure future that is both economically viable and environmentally sustainable.

Visit: https://www.xprize.org/prizes/water for more details.

Middle East

Gaza's dire water/sanitation situation

According to the WHO/Unicef World Health Clusters, only one of the three Mekorot water pipelines from Israel is currently operational. The Al Mentar and Bani Suhaila connections have not been in operation since October and December 2023, respectively, and the Bani-Saeed connection is operating at 6,714 m^3/d (1.77 MGD), or 47% of capacity.

Two of three main SWRO plants are partially functional. The 12,000 m^3/d (3.2 MGD) North region plant hasn't been operational since October 2023. However, the 6,385 m^3/d (1.7 MGD) Deir al Balah and 6,000 m^3/d (1.6 MGD) South Gaza SWRO plants are operational, albeit not at full capacity.

Only 17% of groundwater wells are operating, with 39 destroyed, 93 severely or moderately damaged, and 48 possibly damaged. All wastewater treatment systems are currently not working. Since 19 November, 2023, municipalities have had limited water treatment, no water quality testing capacity, and no fuel for solid waste management, severely impacting the lives of the 1.7 million internally displaced people in the Gaza Strip.

Company News

New, HP SWRO pump introduced at MTC

Denmark's Danfoss has announced a new, high-pressure axial piston pump (APP) for SWRO applications, which are the first to feature ceramics and other surface hardening technologies. According to Georg Herborg, head of innovation at Danfoss High Pressure Pumps, one of the key features of the new ceramic APP technology is that it brings the prefiltration requirements into alignment with the membrane industry standard of 5-micron nominal filtration.

The pumps, which can also be used in SWRO trains with production capacities of up to 7,650 m^3/d (2 MGD), have been trailed at numerous operating plants, including Veolia's 18,000 m3/d (4.7 MGD) Aruba SWRO plant. Bryan de Souza, Veolia's senior process engineer, reports, "When Georg contacted us to test a pre-production version of the new ceramic pump, his brief was simple. 'I want you to try to break it,' he said. We were happy to oblige. But after running it for over 9000 hours without service on Aruba, we had to admit we couldn't fulfill the brief."

Ahead of this week's MTC, Danfoss High Pressure Pumps and Ocean Pacific Technologies (OPT) have agreed to cooperate around the new, ceramic version of Danfoss' advanced high-pressure APPs. According to John MacHarg, OPT's president, the new partnership has great potential. "A ceramic axial piston pump has been my dream for more than ten years. I'm looking forward to the newest version of these pumps, not only to continue axial piston pump technology's disruption of the desal market, but also to pioneer exciting new applications in other areas."

Georg Herborg and John MacHarg are both attending MTC.

Company News

MF/NF membranes relaunched at MTC

In 2020, following the successful product launch of PolyCera UF and NF membrane products, the assets of PolyCera, Inc. were acquired by Singapore-based PSP.US, Inc. However, the timing coincided with the declaration of the COVID-19 pandemic.

According to Jingwen Wang, the company's vice president of products, the pandemic delayed plans to market the organic metal membranes around the world. Instead, they concentrated their sales efforts on China, where they focused on technology and product improvements.

The cumulative installed capacity of PolyCera membranes rose from 10 MGD (37,850 m^3/d) in 2022, to 30 MGD (113,550 m^3/d) in 2023, and according to Dr Wang, the outlook for 2024 is strong, who told WDR, "We are reintroducing PolyCera Membranes to the North American market and growing our business around the world."

The three PolyCera membrane products that will continue to be manufactured in California are:

- *Hydro UF* – delivers high fouling and chemical resistance and suitable for industrial wastewaters with up to 10,000 mg/L TSS
- *Titan UF* – designed for oily water applications with oil concentrations up to 3%,
- *Titan NF* – feature a MWCO of 500 to 1,000 Da, designed for chemical-free color removal

All of the membranes are available in 8-inch diameter, 40-inch long elements, and are normally available from stock.

Visit PSP.US at MTC booth 105.

Company News

Avista Celebrates 25th Anniversary

San Marcos, California-based Avista Technologies is celebrating its 25th anniversary of pioneering membrane treatment technologies. From its humble beginnings in 1999, Avista has evolved into a premier global provider of membrane treatment solutions, offering a wide variety of products and services and serving customers in over 100 countries.

The 2019 integration of Avista as a global brand of Kurita and the recent seamless leadership transition from co-founder Dave Walker to Toshi Maema in 2023 underscore Avista's journey of growth and evolution.

Acknowledging the company's 25 -year history, President and CEO Toshi Maema said, "Since I joined Avista, I've seen the truly impressive relationships our teams have formed, some lasting for a quarter of a century. The company has a remarkable history, from its modest origins to its current position. Its path has been marked by challenges overcome, goals reached, and dreams fulfilled. We appreciate the partners that have supported us with their constant dedication that has propelled not only us but the industry forward, and the endless opportunities that await us."

Visit Avista at MTC booth 609 this week, and help them celebrate their anniversary.

In brief

Toray Industries has announced that it has been awarded a contract to supply its RO membrane elements for the 450,000 m^3/d (119 MGD) Yanbu 4 IWP seawater desalination plant at Ar Rayyis, Saudi Arabia, on the country's west coast. The project is being developed by an Engie/Nesma/Mowah consortium, with Doosan Enerbility service as the EPC contractor. Dammam-based Toray Membrane Middle East LLC (TMME) will supply the RO elements and provide technical services. The projected operational start is expected during the first half of 2024.

Biwater, Inc is relocating its operations to a new facility that is 2.5 times larger than the current one. Richard White, Biwater's president, said that the move is necessary as a result of the company's growth over the past 24 months, which has resulted in over $40 million in recent orders. He said, "Having only moved to our current facility less than 5 years ago, our team is thankful that the new factory and headquarters is just next door. We've been bursting out of our current facility, and we will now be able to expand our research, development and testing capabilities, in addition to being able to efficiently fabricate many more systems." Biwater Inc's new address is 8760 White Oak Ave, Rancho Cucamonga, California, 91730.

Biwater's new Cucamonga facilities, east of Los Angeles

WaterPitch! DC, a water startup matching event, will be held on Tuesday, 19 March, in Washington DC at American University's Constitution Hall. The event matches water startup founders, entrepreneurs, investors, clients & startup programs throughtout North America and around the world to advance innovative solutions for water challenges. Visit www.watercitizen.org/waterpitch-dc-program/ for details.

LG Chem has introduced a new BWRO membrane element. The BW 440 ES L element has an advanced feed spacer technology. The 28-mil, low dP feed spacer is said to help with cleaning, delay fouling, reduce energy use, and increase overall plant uptime. For more information on the 8-inch diameter, 440 ft^2 elements, visit https://tinyurl.com/mrkamzpv.

People

Ramiro Ramirez has been appointed as Toray Membrane USA's western regional sales manager. A former Veolia Water account manager, he will be based in San Diego, California, and may be contacted at ramiro.ramirez.r3@mail.toray.

Nathen Myers, has been appointed as Nijhuis Saur Industries' senior vice president of solutions and product sales. A former vice president of MI Systems, and Suez Water Technologies and Solutions, he is based in Houston, Texas, and may be contacted at nmyers@nsinorthamerica.com.