Water Desalination Report

The international weekly for desalination and advanced water treatment since 1965

Volume 61, Number 14 7 April 2025

California

O&Ps contract awarded for recycling plants

Jacobs was selected as the unanimous choice to be awarded a five-year O&M contract for the West Basin Municipal Water District's water recycling facilities, with a combined treatment capacity of 40 MGD (151,400 m^3/d). The five facilities include the Edward C. Little Water Recycling Facility in El Segundo, the Hyperion Pump Station in Playa del Rey, and three satellite treatment plants in Carson, Torrance and El Segundo.

The contract—which was described as "probably one of the industry's most complex ops agreements" by a water industry veteran—is said to include 21 key performance indicators (KPIs) and performance objectives, and a guaranteed commitment to reduce chemical consumption with substantial cost savings.

Although the annual fee for the first year will increase from approximately $15 million to $31.5 million, much of the additional revenue will be treated as a pass-through, and is not subject to a mark-up. The overall package assumes an average 4% mark-up, and is expected to save West Basin up to $6 million per year, thanks to a series of performance-based incentives, including a commitment to reducing chemical consumption.

Five types of customer-specific recycled water are produced at the treatment plants, ranging from nitrified effluent for use in cooling towers, to two-pass RO permeate for high-pressure boiler makeup. Water from the plants is distributed through more than 100 miles (160km) of pipeline that includes 400 water connections at more than 300 customer sites, including Chevron's El Segundo refinery, Los Angeles International Airport (LAX), SoFi Stadium, Intuit Dome, and Marathon Petroleum's Los Angeles Refinery.

The West Basin MWD's first O&M contract was won by United Water in 1994. In 2000, United was acquired by Suez, who merged with Veolia in 2022, and inherited the contract. Jacobs was selected over three other bidders that submitted proposals for the project in December 2024, and following a transition period, they will take over operations on 1 September.

Israel

Newest member of mega-SWRO Club

This year's votes for Desalination Plant of the Year have been cast, and the final results will be announced in five short weeks from today at GWI's Global Water Summit in Paris. One of the shortlisted contenders for the award is IDE Technologies' Sorek 2 Be'Er-Miriam SWRO Plant.

Last week, Tomer Efrat, IDE's CTO, provided *WDR* with some long-awaited details on the $600 million plant, which was fully commissioned last month. The plant has an installed capacity of 670,000 m^3/d (177 MGD), and a contracted capacity of 555,000 m^3/d (146 MGD) with a 96% availability. It was delivered under a 25-year BOT contract, and produces water at a cost of $0.405/$m^3$ ($1.53/kgal).

In addition to the desal plant, the Sorek 2 project includes an 87MW IPP (independent power project). Although the IPP is a separate entity, it was developed under the same BOT agreement, and the combined heat and power plant will be operated by OPC Energy.

The Sorek 2 plant is located 15km (9.5 mi) south of Tel Aviv, on a 9.4ha (23-acre) site, and adjacent to the 640,000 m^3/d (169 MGD) Sorek 1 SWRO plant, which was designed and built by IDE in 2013. However, in 2018, IDE sold Sorek 1 to Dan Capital in a deal with Israeli antitrust authorities that allowed IDE to bid the Sorek 2 project.

Seawater for the plant is obtained via a 2.6m (8.5 ft) diameter, 3.25 km (2 mi) long intake pipeline, approximately 1.5km (0.9 mi) of which is located offshore, while the concentrate discharge line is 4km long, with about 2km (1.24 mi) located offshore. The offshore, and portions of the onshore, pipelines were installed below ground using pipe-jacking, a trenchless technique that employs reinforced concrete pipe segments pushed through the ground using hydraulic jacks to avoid shoreline and seabed impacts.

Efrat said that pretreatment is provided by a single-stage of dual media, gravity filters, adding, "Ours operate as biofilters, thus, we can almost eliminate the use of chemicals in the filter. A minimal amount of ferric sulphate is used during a short part of the year, while polymer is not used at all, and the filters are followed by 20-micron cartridge filters."

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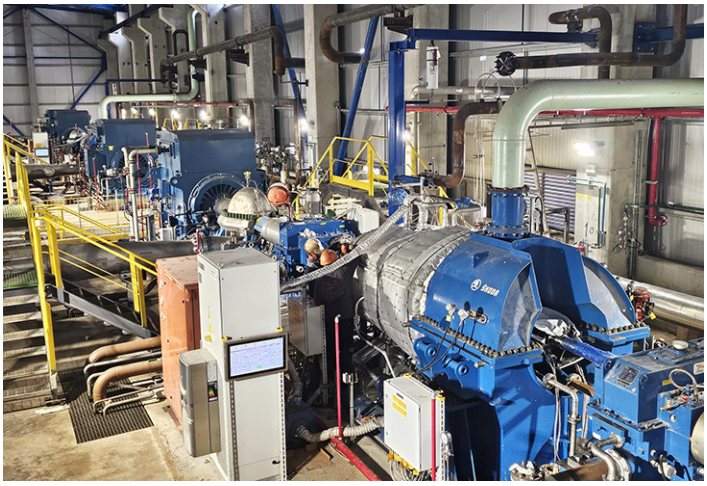
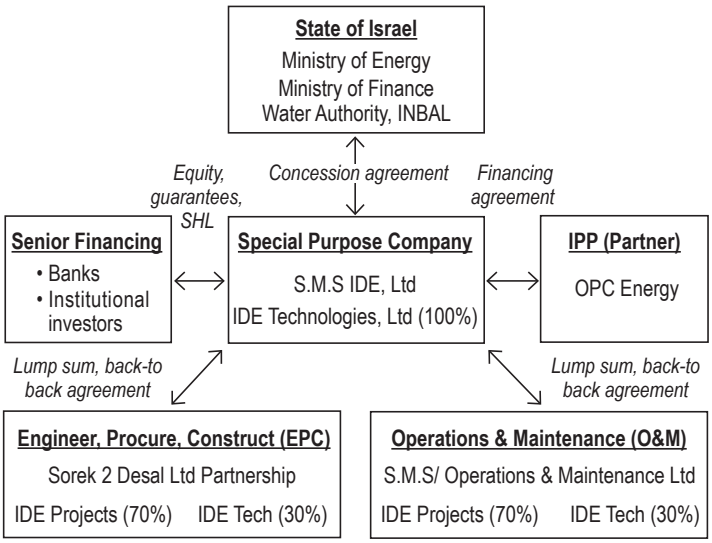


Sorek 2's steam-driven high-pressure RO pumps

The plant's most unique feature is its use of multiple steam-driven, direct-drive pumps in the pressure center. Efrat said that each steam turbine is connected to two high-pressure pumps, a configuration that is said to improve efficiency by 7-10%. The configuration enables the use of a variety of waste heat sources available in the industry, and "green-steam" generated from biomass and/or biogas, to significantly reduce the plant's carbon footprint.

The plant also features an integrated carbon capture system, which absorbs CO_2 from the captive power plant and recycles it for reuse in post-treatment remineralization.

Like most IDE SWRO plants, Sorek 2 employs a single pressure center arrangement in which a common set of high-pressure pumps serve all 40 first-pass skids. The membranes are also arrayed in IDE's familiar four-stage, partial two-pass "cascade" arrangement so as to meet Israel's strict boron requirement of <0.4 mg/L.



Sorek 2 Project Structure

The membrane racks are tall, stacked with 22 rows of horizontal pressure vessels—with provisions to add two more rows in a possible future expansion—with each vessel loaded with eight membrane elements. The frames were prefabricated at IDE's Bar Lev Industrial Park fabrication facility in northern Israel.

Commissioning of the first half of the project took place 32 months after construction began, and the full plant took 36 months.

Tennessee

Polymeric UF gets Ceramic makeover

In April 2014, the Knox Chapman Utility District (KCUD) commissioned a new surface water treatment plant in eastern Tennessee at a production capacity of 8 MGD (30,280 m^3/d), with the ability to treat a peak flow of 10 MGD (37,850 m^3/d). The plant was outfitted with four trains of ZW1500 polymeric hollow-fiber UF membranes, and was designed to treat feedwater from the French Broad River. Following intake screening, feedwater for the direct filtration plant was first coagulated and flocculated ahead of the membrane system.

However, as the membranes began to age, the time spent dealing with fiber repairs began to increase. By the time the membranes were over nine years old, KCUD was spending four to six days per week on fiber repairs, and a pilot study that employed ceramic membranes was planned.

In late 2023, Massachusetts-based Ultressa LLC conducted a one-month pilot study at the plant using its Ultressa UF ceramic membranes. According to WK Dickson's Rick Kirby, a KCUD consultant, "The test was performed for about one month, and we experienced some of the worst raw water quality from the French Broad River. The system performed at 177 gfd [300 LMH] during periods of 40°F [4.4°C] water temperatures, low alkalinity, and an NTU of 117. The only [operational] change in the system was to increase the length of the backwash from 20 seconds to 25 seconds."

Based on the results of the study, a complete replacement of the existing 576 polymeric membrane modules was planned, using 248 8-inch diameter, 6-feet (1.8m) long, Ultressa silicon carbide ceramic membrane modules. The company was contracted to install the new modules, which took approximately three days per train, with help from the

KCUD WTP following Ultressa ceramic UF retrofit – Note capped fittings on filtrate header, which previously accommodated original modules

KCUD's staff. The only piping required was the pipe to connect the module to the existing headers.

The ceramic membranes were designed for a slightly lower, 150 gfd (255 LMH) flux at a peak flow of 10 MGD (37,850 m^3/d), which will allow for future expansion to 24 MGD (90,849 m^3/d) within the same building.

The plant operates at variable flow rates based on tank levels, and there are short periods when trains operate at up to 2.5 MGD (9,462 m^3./d), especially when one train is down for a cleaning, which may increase transmembrane pressures (TMP) to 30 psi (2 bar).

According to Crosstek senior director Dr Stanton Smith, "This stresses the polymeric membranes, particularly in very cold weather, causing higher power costs and fiber breakage rates, and generally higher maintenance, even in winter, when the average demand should be lower."

"This past winter, just as we were beginning to start the ceramic membrane installation, the plant experienced peak fiber breakage. They opted to derate the plant's LRV [log removal value] and install the ceramic replacements, before returning to their normal LRV."

The plant finished commissioning last month, and the system is said to be performing very well, with reduced TMPs, higher LRVs, and lower chemical and electrical costs.

KCUD General Manager Scott Prater said, "Our operational staff are very pleased with the Ultressa membrane system and its performance. The installation process was performed by Ultressa personnel and our operating staff, which provided buy-in from our staff, and a better understanding of the system and operations. We are also looking forward to the 20-year life span of the ceramic membranes."

Editor's note: Ultressa LLC is the supplier of Ultressa ceramic membranes, in partnership with CrossTek, an Aris Water Solutions company.

IN BRIEF

An **Energy Recovery, Inc white paper** titled *Energy Recovery Beyond Seawater: How the technology that reshaped SWRO can evolve water reuse and low-pressure desalination*, is available for downloading at https://tinyurl.com/5fembhsc.

With **Cyprus**' reservoir capacity having reached a new low of 24.1%—over 50% lower than this time last year—the Council of Ministers has approved a new framework to expedite private desalination facility development ahead of the coming tourism season. The new framework cuts permitting time from one month to one week by eliminating environmental scrutiny, with authorities offering to cover 30% of the cost of construction for single units of up to 1,500 m^3/d (0.4 MGD), and 50% for joint projects serving multiple users.

Pennsylvania-based **Aquatech** has announced a growth investment from New York-based Cerberus Capital Management, a leader in alternative investing. Aquatech, which was founded in 1992, said that its growth strategy focuses on geographic expansion in key markets, investment in key technologies to enable lithium production, membrane manufacturing, and expansion of its mobile fleet and digital services offering. The company recently broadened its offering with an investment in FTS H_2O, a manufacturer of advanced membranes and separation technologies, and a strategic partnership with AECOM on PFAS destruction technology. Aquatech has been shortlisted for GWI's Technology Company of the Year, which will be announced on 13 May in Paris, France.

California-based **OceanWell** has taken the next step in its plans to commercialize a subsea water farm off the California coast. The company is developing a system that will use the hydrostatic head from seawater depths > 400m (1,300 ft) to drive the SWRO process. Late last month, in conjunction with the Las Virgenes Municipal Water District, it launched a pilot unit at the Las Virgenes Reservoir in Westlake Village, California, to prove the efficacy of its proprietary technology. The next test phase, which has already received approval from the California Coastal Commission, is planned to take place in the ocean. The company envisions commercial units will have a production capacity of 1 MGD (3,785 m^3/d), and will reduce energy consumption by up to 40%.

Although more than $1.8 billion worth of contracts in water and sanitation have been suspended or terminated by the US Agency for International Development (USAID) since late February, Jordanian desal projects have apparently been spared. Approximately $46.8 million of project work in Jordan, including work being done by CDM Smith in support of the 851,000 m^3/d (224.8 MGD) **Aqaba-Amman Desalination and Conveyance Project**, will continue. Other US participation in the Aqaba-Amman project, by the US International Development Finance Corporation and others, is believed to be unaffected.

With Melbourne, Australia's water storages 12.9% lower than they were at the same time last year, the Victorian State Government has ordered 50 gigalitres of water from the **Victorian Desalination Plant** (VDP) in Wonthaggi for next financial year to safeguard Melbourne's water storages. The amount represents one-third of the VDP's 450,000 m^3/d (119 MGD) production capacity. The plant was commissioned in December 2012.

Texas's Senate has unanimously approved SB7, a water bill that includes proposals to boost the state's water supply needs by prioritizing brackish and seawater desalination, produced water treatment, and reservoir projects. The bill is said to rely on collaboration, rather than competition between different regions within the state. The Texas Water Development Board must now establish rules on how to prioritize project funding. A constitutional amendment that will accompany the water bill will annually dedicate $1 billion to the Texas Water Fund for up to 10 years. SB7 will now be taken up for debate by the House.

PFAS fact stranger than fiction: Last week, *WDR* had planned to do an elaborate April Fools' story involving the use of magnets to remove PFAS from drinking water. A faux university was created, along with a journal called *PFAS: Today, Tomorrow and Forever* and a lab tech named Billy who serendipitously made the game-changing discovery. However, while researching PFAS characteristics, it was found that University of Queensland (Australia) researchers had beaten your correspondent to the punch. Using a reusable adsorption aid to coat PFAS particles, they demonstrated the ability to remove up to 95% of PFAS particles in less than one minute using a magnet. A commercially available product should be available in three years. Visit https://doi.org/10.1002/anie.202213071 to see a paper on the subject.

People

Yuliana Porras-Mendoza has been appointed Jacobs' integrated water practice leader. Formerly Garver's ONE Water practice leader and Reclamation's desalination research program manager, she will remain based in Denver, Colorado, and may be contacted at Yuliana.PorrasMendoza@jacobs.com.

BW Water Americas (formerly SafBon Water Technology) has announced the appointment of **Andrew Zaske** as vice president for the Americas. He has previously held executive and management roles at WaterSurplus, Tolomatic, and GE (Osmonics). Andy will divide his time between Minneapolis, Minnesota, and Tampa, Florida, and may be contacted at andy.zaske@bw-water.com.

Rosemary Niechcial has been appointed CEO of IDE Water Solutions North America. Formerly the director of sales for Panametrics, and the managing director of Wayport Infrastructure, she is based in Houston, Texas, and may be contacted at rosemaryn@ide-tech.com.

Brian Biesemeyer has been named as the interim executive director of the WateReuse Association, to replace Pat Sinicropi. Formerly the executive director for the City of Scottsdale, he is based in Arizona and may be contacted at bbiesemeyer@watereuse.org.

After an illustrious, 36-year career in the membrane industry, including 19 years with Toray in Europe, **Peter Küppers** is retiring. For the past 11 years, he has served as the chief sales officer at Toray Membrane Europe in Basel, Switzerland. His extensive experience also includes roles at KMS (Koch), GEA, and Zenon. Peter shared his plans for retirement: "I plan to stay in shape, travel, and enjoy life." He may be contacted at: p.kueppers.erk@gmail.com.

After 45 years of service to the water industry, dozens of BOO contracts, in just about every industry you can imagine, **Robert "Bob" Gorgol** is retiring from Veolia WTS as general manager of the Caribbean region. Bob lives in the Woodlands, Texas, is available for consulting, and may be contacted at robert.gorgol@gmail.com.