

**EDITOR'S FOCUS**

*Private Investment*  
**Building Water Resources  
 for Global Water Needs**

By Ralph E. Exton

*Seawater and brackish water desalination supplies more than 80% of the freshwater on the Spanish island of Gran Canaria, a popular tourist destination off the northwest coast of Africa that is home to more than 800,000 residents. The numerous desalination plants on Gran Canaria are essential to supplement scant rainfall, which provides only 10 in. of freshwater annually.*

*Updates and trends on  
 desalination technology  
 around the world*

Without the desalination plants, the island could not provide adequate water supplies for residents, businesses, agriculture and a growing tourism industry that hosts more than 2.5 million visitors each year.

Reverse osmosis (RO) continues to be the primary method of desalination on Gran Canaria and throughout the Canary Islands, largely because the technology continues to evolve and improve since the first RO desalination system appeared on the island almost 40 years ago. Today, systems are more efficient, offering higher recovery rates, reduced energy consumption and lower operating costs. In the past 20 years alone, the cost to produce desalinated water has fallen by more than 80%.

**Private Investment**

The Canary Islands have also witnessed an evolution in project delivery, with many desalination plants being financed, built and operated through private companies rather than governments. Municipal water services, such as the Maspalomas Desalination Plant on Gran Canaria, have selected the build-own-operate approach as a way to leverage best-in-class technologies and the extensive capabilities that experienced companies can bring to the financing, design, construction and operation of much-needed water treatment systems. Municipalities can also avoid large capital expenditures for water treatment infrastructure, instead paying a prenegotiated rate for water over a predetermined period of time.

In the case of the Maspalomas Desalination Plant, which is owned and operated by GE Water & Process Technologies and local water distribution company Elmasa, the municipality leveraged GE's extensive portfolio of advanced desalination technologies to develop an innovative solution that treats saline water from various sources. RO membranes were selected to produce potable water from seawater, while advanced electro dialysis reversal (EDR) technology removes salt from brackish well water.

Maspalomas Desalination Plant is one of the largest on the Canary Islands and has been expanded multiple times to accommodate increasing demand since its construction almost 20 years ago. Today, RO membranes treat up to 6.4 mgd (24,000 m<sup>3</sup>/day), while the EDR process can handle 5.3 mgd (20,000 m<sup>3</sup>/day).

**Build-Own-Operate Contracts Ideal**

Industrial and recreational water needs are also being met through build-own-operate contracts, with some sites choosing to build small onsite facilities to provide water exclusively for a particular location, or instead choosing to negotiate off-take agreements with centralized water providers. The Point Lisas Industrial Park on the western shore of Trinidad is one such development. Constructed by the company Desalcott, the Water and Sewerage Authority (WASA) of Trinidad and Tobago conducted nearly four years of planning before selecting the ideal solution to provide high-quality, low-cost water for municipal and industrial use. Under the



**TOP FAR LEFT:**  
 Owned and operated by GE, the Maspalomas Desalination Plant on Gran Canaria provides water to municipal and industrial customers.

**MIDDLE**  
 The 100-mgd Sulaiybiya Wastewater Treatment and Reclamation Plant in Kuwait was built by a consortium of companies who will retain ownership and operations for 30 years.

**ABOVE**  
 A public/private partnership enabled the construction of the Hamma Seawater Desalination Plant to answer a dire need for water in Algiers, Algeria.

23-year agreement, the 29-mgd (110,000 m<sup>3</sup>/day) facility produces water for WASA, which in turn distributes the water to the industrial park.

As projects continue to increase in size to meet growing demand in water-scarce regions around the world, private or public/private structured financing is becoming a key enabler to bringing these projects to life. Structured financing tools such as tax-exempt private activity bonds or establishing special-purpose vehicles or "project companies" are helping cities overcome project financing hurdles and move more quickly toward contractual agreements and the construction of water treatment plants.

GE's ecomagination-certified water treatment solutions are another way the company is addressing the world's growing demand for clean water. The company's portfolio of ecomagination products—which include RO, UF and EDR technologies—are designed and independently verified to help solve the world's toughest environmental challenges by improving operating efficiencies and reducing pollution.

### Solutions for Water-Scarce Regions

The Hamma Seawater Desalination Plant (SWDP) in Algiers, Algeria, is Africa's first RO desalination plant to be built with public and private investment. The project combines 70% financing from GE with 30% financing from the state-owned Algerian Energy Co. The Overseas Private Investment Co., which helps U.S. businesses invest in new and emerging overseas markets, financed \$200 million toward the project.

Hamma SWDP will boost Algiers' municipal water supply by 53 mgd (200,000 m<sup>3</sup>/day)—enough to meet 25% of the city's daily water demand. This new source of water will significantly improve living conditions and economic opportunities for the city, which has been critically short of water for many years. Having grown from 500,000 people to more than 3.2 million in just 50 years, demand has significantly outstripped supply, leaving many residents with water for only a few hours per day, or sometimes only once every three days.

### California Looks to Private Infrastructure

More recently, GE announced that it will participate as an equity partner in the Carlsbad SWDP in San Diego County, Calif. This proposed 50-mgd facility will be North America's largest seawater desalination plant. The project involves a public-private partnership between Poseidon Resources and the city of Carlsbad and will be financed by setting up a project company using a combination of private equity and debt financing through the use of either tax-exempt private activity bonds or taxable bonds. The Metropolitan Water District is also participating, offering a subsidy of \$250 per acre-ft to municipalities that are purchasing the water.

As Poseidon Resources continues to obtain the necessary permits to begin construction of the plant, it has also obtained commitments from 15 water agencies in the surrounding area to purchase water from the plant. These

commitments account for 100% of the plant's capacity, demonstrating an indisputable need for freshwater in the area.

### Reclaiming Water

While many are turning to the ocean for new water sources, others are reclaiming water that they already have and using advanced technologies to transform wastewater into a valuable new source of nonpotable water. Currently, the largest plant to do this is the Sulaibiya Wastewater Treatment and Reclamation Plant near Kuwait City, Kuwait. This 100-mgd facility was designed and built and is currently owned and operated by a consortium of companies that includes The Kharafi Group and GE. The contract assigns ownership of the plant to the consortium for 30 years before it is transferred to the Kuwaiti government. The deal also awarded a 27.5-year operations and maintenance contract to GE.

The plant treats secondary effluent from the nearby Ardiya Wastewater Treatment Plant and produces high-quality effluent that is safe for unrestricted use in nonpotable applications such as agricultural irrigation and car washing. It is also the world's largest water reuse plant to combine membrane UF pretreatment with RO membranes.

### Global Opportunities

Increasing water demand and decreased supplies caused by overuse or climate change are straining the ability of even the world's wealthiest cities to ensure stable, long-term water supplies. Populations will continue growing, while available water supplies will remain unchanged or may even decrease. Moreover, water quality is also declining from many sources, leaving water providers searching for solutions that can not only help them provide clean, safe water that meets increasingly stringent regulations but also provide adequate supplies of it.

Innovative business models that combine public and private interests offer one solution that can accelerate project delivery and ensure that the most advanced and cost-effective technologies are addressing the challenges communities are facing. Though each project is unique, careful planning, engineering and financing will provide a path for communities and businesses to secure adequate, high-quality water supplies that will protect public health and promote economic growth. **WWD**

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