

California Opens Up to Desalination

The Golden State charts its course for future water supplies.

By Nikolay Voutchkov

Seawater desalination has been gaining popularity in California over the last five years, as many coastal municipalities and utilities are challenged with population growth pressures, prolonged drought patterns, and escalating water production costs. By 2030, the state's population is projected to increase from 36.5 to 48 million, which in turn will require over one billion gallons per day of new fresh water supplies. Recognizing that this water supply demand cannot be met by only relying on traditional water supply sources, conservation, and reuse, the California Department of Water Resources has charted a new course for exploration of seawater and brackish water desalination as an addition to the state's water portfolio. Currently, there are a number of large seawater desalination projects in various stages of development.

Currently, Southern California imports about half of its water from two main sources—the Sacramento Bay—San Joaquin River Delta, traditionally known as the “Bay-Delta,” and the Colorado River. To address the uncertainties associated with the long-term use of imported water from these sources, a number of Southern California water utilities have charted plans for diversification of their water supply, adding desalination to improve

long-term water supply sustainability. By 2020 all Southern California coastal utilities are planning to supply 10 to 20 percent of their drinking water from the ocean.

At present, the 50-mgd Carlsbad and Huntington Beach seawater desalination projects are the most developed. Both projects are co-located with coastal power generation plants using seawater for once-through cooling. The two desalination projects are developed as public-private partnerships between Poseidon Resources ([concentrate generated during the reverse osmosis membrane separation process. These milestone permits clear the way for completion of the project environmental review process by the fall of 2007 and for starting facility construction in 2008. The two projects are targeted to be in operation by the end of 2010 and to supply six to ten percent of the drinking water in Orange County and San Diego County. When completed, the two projects will be the largest seawater desalination plants in the western hemisphere.](http://www.poseidonre-</p></div><div data-bbox=)

Most Southern California projects, with exception of the Huntington Beach and Carlsbad desalination facilities, are at the stage of initial feasibility assessment and review. The West Basin Water District has been operating a pilot seawater desalination plant over the past several years. The city of Long Beach Water Department has recently started the operation of a 0.5-mgd seawater desalination demonstration plant that will compare the use of single-stage reverse osmosis and two-stage nanofiltration for seawater desalination.

The need for supplemental drought-relief water supplies, groundwater basin overdrafts and associated seawater intrusion, and measurable ecological impacts of some current water supply practices are driving forces for renewed interest in seawater desalination in Northern California. Most of the proposed projects are located in the San Francisco Bay Area and in Monterey County.



Huntington Beach Seawater Desalination Project

sources.com) and local utilities and municipalities.

The environmental impact assessments and local land use permits for the Carlsbad and Huntington Beach desalination projects were approved in the first half of 2006. In August 2006 both projects were granted ocean discharge permits for disposal of the high-salinity

Currently, a partnership of San Francisco Bay Area water districts (Contra Costa Water District, Easy Bay Municipal Water District [EBMUD], Santa Clara Valley Water District, and the San Francisco Municipal Utility District) are studying the feasibility of several seawater desalination plant locations—one in San Rafael in partnership with the Marin Municipal Water District (MMWD), one in Oakland, and one at the Mirant Power Plant in Pittsburg, Contra Costa County. A fourth location is also considered—a site near Ocean Beach on the Pacific Ocean. If construction of seawater desalination plants is found viable, this initiative may yield one to three seawater desalination plants with a total production capacity of 20 to 80 mgd within the next five years.

EBMUD is developing another seawater desalination facility, which is planned to be co-located with the C&H Sugar food processing plant in Crockett. This facility would use up to three mgd of cooling water from the food processing plant to produce 1.5 mgd of desalinated water for industrial uses. The desalinated water would replace the drinking water the refinery currently receives from EBMUD. The concentrate from the desalination plant will be discharged through the existing wastewater outfall of the C&H Sugar plant.

MMWD is also developing a large seawater desalination project in the San Francisco Bay area. This project is targeted to produce between 10 and 15 mgd of desalinated water and to provide a reliable, drought-proof alternative to the construction of a new pipeline for supplemental water supply from the already over-allocated Russian River. MMWD has recently completed a 12-month desalination pilot test and is well under way with the preparation of environmental impact assessment for this project. The draft environmental impact report was expected to be circulated for public review this spring.

More Projects

Monterrey County, which is located south of the San Francisco Bay Area, is currently the grounds for the development of several new seawater desalina-

tion projects. Two large competing projects are proposed in the city of Moss Landing. The first project is a regional seawater desalination facility planned to be delivered under a public-private partnership between Pajaro-Sunny Mesa Community Services District and Poseidon Resources. The regional desalination plant would be located at a former National Refractories industrial plant site, which is adjacent to the Moss Landing Power Generation Station. This desalination project would use the existing National Refractories open intake and ocean outfall. Alternatively, the project developers are considering supplying warm cooling seawater to the desalination plant from the Moss Landing Power Generation Station, when available, to reduce impingement and entrainment of marine organisms and to minimize the amount of power used for reverse osmosis separation.

Most of the potable and irrigation water used in Monterey County comes from a coastal aquifer, which has been steadily increasing in salinity due to over-pumping. The main purpose of the regional seawater desalination project proposed by the Poseidon/Pajaro-Sunny Mesa team is to replace the use of groundwater from the coastal aquifer with desalinated seawater and thereby minimize further seawater intrusion.

The California American Company (Cal-Am) is developing a smaller, 12-mgd project at the Moss Landing Power Generation Station site and proposes to use the power station's cooling water discharge as an intake and discharge of the desalination plant. The main purpose of this project is to offset the environmentally damaging diversion of large volumes of fresh water from Carmel River, which currently is used as a main source of water supply to Cal-Am's customers

in the southern part of the county. Although this project is being developed parallel with the Pajaro-Sunny Mesa/Poseidon desalination project, most likely only one of the two projects will be built. The regional desalination project proposed by Pajaro-Sunny Mesa/Poseidon is designed to accommodate Cal-Am's water demand.

Besides the several large projects described above, there are a large number of other smaller projects under development in Northern California. Most of these projects are in early phases of feasibility and environmental studies, and are not expected to yield full-scale desalination plants before 2012.

Within the next five to ten years many Californian coastal communities are planning to make seawater desalination a permanent part of their water portfolio. Over one dozen seawater desalination plants supplying up to eight percent of California's total water demand are projected to be built by 2020. Although existing fresh water sources, conservation, and reuse will continue to play a central role in the state's long-term water supply strategy, seawater desalination has unique appeal to many coastal communities because it allows access to a reliable and drought-proof source of drinking water that can be developed and controlled locally. **GE**

Mr. Voutchkov is Senior Vice President-Technical Services, Poseidon Resources Corporation, and can be reached at 203-327-7740, extension 126 or nvoutchkov@poseidon1.com.



Long Beach Seawater Desalination Demonstration Project