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Water, Water, Everywhere...

Seeking Fresh Sources, California Turns To the Salty Pacific, But Desalination Plants Face Criticism on Environment, Costs

 By **KATHRYN KRANHOLD**
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Water-short California's search to satisfy its thirst is beginning to focus on a controversial source -- the Pacific Ocean.

In November, Connecticut-based Poseidon Resources Corp. won a key regulatory approval to build a \$300 million water-desalination plant in Carlsbad, north of San Diego. The facility would be the largest in the Western Hemisphere, producing 50 million gallons of drinking water a day, enough to supply about 100,000 homes.

Taking the salt out of seawater is a common way to produce drinking water in the Middle East and in other arid regions. World-wide, 13,080 desalination plants produce more than 12 billion gallons of water a day, according to the International Desalination Association.



Tampa Bay Water

 Tampa Bay Water's
 desalination plant in Florida


But it has been less successful in the U.S. Desalination is more expensive than traditional sources, and critics say it harms the ocean. In 1992, Santa Barbara, Calif., shuttered a small plant after three months when rain replenished the county's main water sources. At a plant near Tampa, Fla., that Poseidon was also involved in, technical glitches increased the water's cost and, when it opened in 2003, initially limited output to less than a third of the projected 25 million gallons a day.

Southern California water officials say conditions have changed. Improved technology has cut the cost of desalination in half in the past decade, making it more competitive. And traditional water supplies, such as the Colorado River and snow-melt runoff, are becoming less reliable because of population growth and environmental restrictions.

"We have to get our water from somewhere, and it's going to be the Pacific Ocean," says Gary Arant, manager of the Valley Center Municipal Water District, which serves farms and homes around San Diego. His district has agreed to buy almost 15% of the Carlsbad plant's output. Poseidon says it has signed 30-year contracts with nine local water districts to sell all the water; about 40% would go to the city of Carlsbad.

The project has attracted big financial partners. In May, **General Electric** Co. said it had invested in it and would provide filtration technology. In September, **Citigroup** Inc.'s sustainable-development-investments unit became the lead investor in closely held Poseidon, formed in 1995 by former GE executives and private-equity firm Warburg Pincus. Andrew de Pass, the Citigroup

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unit's managing director, says the need for long-term water sources drove the investment. He declined to specify how much Citigroup invested.

Poseidon hopes to break ground this year and deliver water no later than 2011, providing it wins approval for its plans to mitigate the plant's impact on marine life and to offset its carbon-dioxide emissions.

The plant would initially take the saltwater discharged from an adjacent power plant that uses it for cooling, and later take water directly from the Pacific. Two sets of filters purify the water. The first set, thin tubes resembling rows of angel-hair pasta, blocks relatively large particles. The seawater is then pumped at very high pressure through dense membranes to remove salt, in a process called reverse osmosis.

This process uses a lot of electricity, contributing to its big price tag. Poseidon plans to sell the water for about \$950 per acre-foot. That compares with an average \$700 an acre-foot that local agencies now pay for water. (An acre-foot is 325,851 gallons, enough water for four people a year.) The Metropolitan Water District, a wholesale supplier to 18 million Southern Californians, will subsidize the difference as a way to add new water sources to the region. Poseidon President Walter Winrow says Poseidon will raise its price as local agencies pay more for water from other sources.

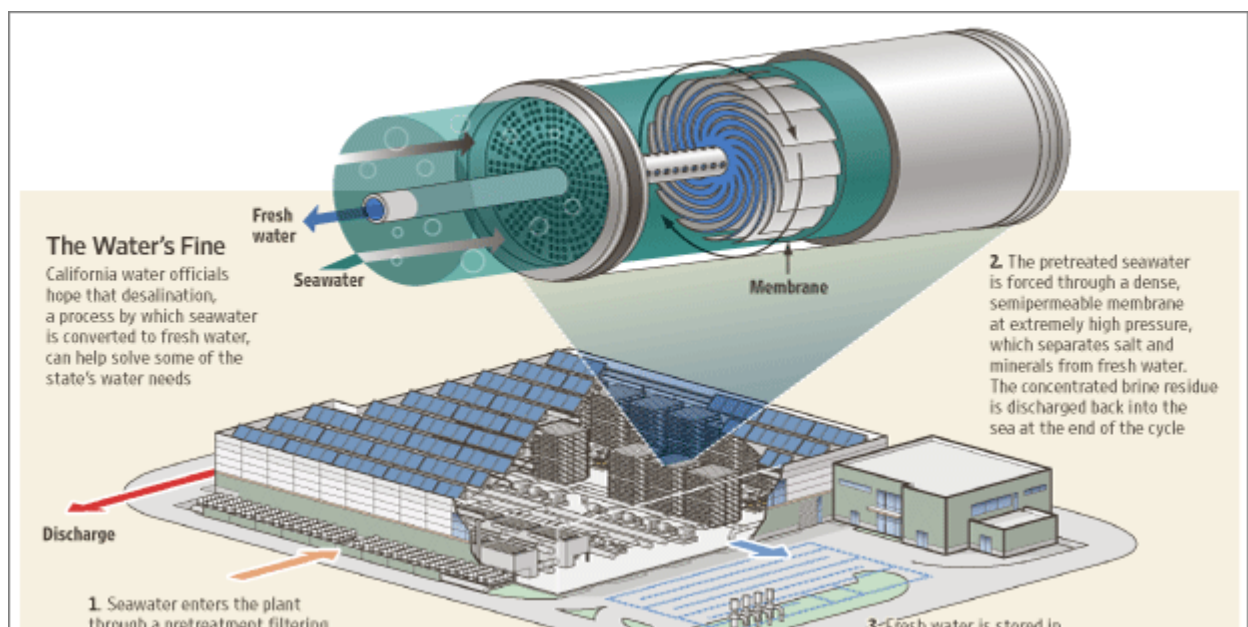
Peter Gleick, head of environmental think-tank Pacific Institute, says the costs of desalination projects tend to increase from those projected by sponsors, because of energy expenses and environmental requirements. "What people claim is always a little different," says Mr. Gleick.

There are other obstacles. California coastal regulators and some environmentalists say desalination uses too much energy and kills fish when the water is processed. Two environmental groups Monday filed suit to block the plant, on the grounds that it will harm marine life. Peter MacLaggan, who oversees the Carlsbad project for Poseidon, says the plant would kill about two pounds of fish a day, or "less than the daily consumption of one pelican."

Some opponents are wary of Poseidon because it was originally the co-developer of the troubled Tampa plant. Poseidon and the engineering firm it was working with estimated in 1999 that the plant would cost \$110 million to build and produce water costing an average of \$677 an acre-foot.

Then two engineering firms involved in the plant ran into financial difficulties, slowing work on the project.

In
2002,





Tampa Bay Water, the government agency building the plant, bought out Poseidon and took on plant oversight. Tampa Bay Water ultimately brought in other companies, including units of Spain's **Acciona S.A.** and Germany's RWE AG, to finish and run the plant.

Last month, years behind schedule, the plant was declared fully operational, producing more than 25 million gallons of drinking water a day. Exceeding the initial estimate, construction came to \$158 million, and the desalinated water costs \$1,100 an acre-foot. Tom Pankratz, a Houston-based consultant to Tampa Bay Water's lawyers and a spokesman for the IDA, says there was "sloppy work" across the board. Poseidon's president, Mr. Winrow, says the company "would have managed the construction more appropriately" if it had been allowed to finish the project.

Ken Herd, Tampa Bay Water's operations director, says the plant is mostly running smoothly and the region may build more plants. Desalination is "not the cheapest source of supply, but it's drought-proof," he says.

Southern California officials toured the Tampa Bay plant before signing with Poseidon on the Carlsbad plant. Poseidon has brought in Acciona and RWE'S American Water to design and operate it.

Meanwhile, improved membranes and pumping systems have sharply reduced electricity costs. G.G. Pique, chief executive of Energy Recovery Inc., which makes desalination technology for the plant, estimates it will cost the Carlsbad plant \$1.10 in electricity to produce 1,000 gallons of water. That is down from \$2.10 per 1,000 gallons at the mothballed Santa Barbara plant, which he was also involved in.

The push on the Carlsbad plant comes as the National Academy of Sciences nears completion of a report on the potential role of desalination in meeting U.S. water needs.

Water experts are watching closely. California regulators are mulling as many as 20 proposed seawater projects that could produce 500 million gallons of water a day for the state. Poseidon is planning a second major plant in Huntington Beach, about 60 miles north of Carlsbad. "We're excited about the prospects," says Mike Chrisman, California's Secretary of Water Resources.

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