

Desalination plants aren't a good solution for California drought

As surely as the hot, dry Santa Ana winds bring blue skies to the coast and wildfires to the hills, severe California droughts bring calls to build desalination plants up and down the seashore.

All that ocean water, begging to be converted to fresh and pumped into our pipelines, would solve our water supply problems instantly and permanently, boosters say. In the coming months, the drumbeat will only get louder. That's not only because the current drought is the longest and most severe in memory, but because [a \\$1-billion desalination project](#) scheduled to start operating in Carlsbad this fall will be attracting lots of attention. The plant, the largest of its kind in the U.S., is designed to provide San Diego County with about 50 million desalinated gallons a day, about 7% of its water needs.

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"A lot of people are watching what's going to happen in Carlsbad," says Peter MacLaggan, the executive overseeing the project for its developer, privately held Poseidon Water. "They're going to base their future decisions on the success of this project."

That could be a mistake. MacLaggan himself doesn't expect desalination to be "a major component in our lifetime" of the state's overall water supply, although Poseidon has proposed to build a second desalination plant, [in Huntington Beach](#). That plant is still awaiting approval from the California Coastal Commission.

Enthusiasm for desalination tends to overlook its high costs, which stem in part from its enormous energy demand and weighty environmental footprint. The modern process, known as reverse osmosis, involves forcing seawater at high pressure through a membrane that screens out the salt, leaving behind a heavily brackish residue.

In Southern California, which has become more dependent on fossil-fueled electric generation since the shutdown of the San Onofre nuclear power plant, Carlsbad arguably will be moderating the effects of climate change on the region while also contributing to the greenhouse gas emissions that help cause it. (MacLaggan says Poseidon will buy carbon credits and restore local wetlands to offset the plant's environmental impact.)

"There are definite advantages to seawater desalination," says Heather Cooley, water program director at the Oakland-based environmental think tank Pacific Institute. "It's a reliable supply, independent of weather conditions like drought. But it's still among the most expensive water supply options."

Let's take a look at the hard realities. As big industrial facilities, desalination plants can't be plunked down just anywhere on the coast without destroying the qualities that attract people to the shoreline. Yet the plants need to be close to customers, with room for pumps, pipelines, inflows and outfalls.

[Poseidon rejected three locations](#) before settling on the Carlsbad site, which is next to NRG Energy's Encina Power Station. That allowed the new plant to share the seawater-cooled power station's water lines, which reduced its cost and its impact on marine life. Even so, according to a 2012 state appeals court ruling, the plant had to install extra equipment to reduce its marine impact in periods when Encina isn't running; if the power plant shuts down permanently, the desalination plant may have to submit a new environmental impact report.

The San Diego County Water Authority has committed to purchasing the plant's entire output for 30 years — a deal that was crucial for Poseidon's financing — for about \$2,100 to \$2,300 per acre-foot, plus inflation. An acre-foot is 325,851 gallons, or about a year's usage for one or two five-member families. The county agency, therefore, will be paying at least \$110 million a year, whether it needs the plant's water or not. San Diego water bills are projected to

rise by an average of \$5 to \$7 a month to cover the cost.

The county judged that it might pay about that much in the future for other imported water, which makes the commitment look like a long-term hedge against a continuing water crisis. But desalinated water is far more expensive than other existing sources. San Diego currently pays \$923 per acre-foot for treated water from the Metropolitan Water District. The Pacific Institute reported in 2012 that San Diego could obtain recycled water for as little as \$1,200 per acre-foot, and that the marginal cost of water obtained through conservation and efficiency measures was as little as \$150.

San Diego is making a risky bet that may be ill-advised in a crisis. "Investing in desalination is not a good way to address a drought," says [Henry J. Vaux Jr.](#), an emeritus water economist at UC Berkeley, "because by the time you finish it the drought is over."

That's what happened to Santa Barbara, which began building a \$34-million desalination plant during the drought-stricken 1980s. By the time it was completed in 1992, the rains had returned; the facility went through a few weeks of pilot testing, then was mothballed and partially dismantled. The city is now contemplating restarting it at [a cost of \\$40 million](#), plus \$5 million a year in operating costs. That would place the cost of desalinated water at about \$3,000 an acre-foot and drive up average monthly household water bills to \$108 from \$78 today.

Santa Barbara's experience has been replicated on a much larger scale by Australia, which after 2006 invested more than \$12 billion in six desalination plants — the largest of them twice the capacity of Carlsbad's — only to mothball four in 2012, after returning rains overfilled the country's reservoirs.

The least visible cost, of course, is environmental damage. Ocean inflows suck up and kill larval marine organisms. At the other end of the desalination cycle, the salt extracted from seawater produces a heavy brine to be pumped back into the ocean, potentially destabilizing the ecology around the outflows.

"Dumping water that is saltier than seawater into the ocean isn't harmless," says Vaux, who contributed to a [2008 blue-ribbon study of desalination](#) for the National Research Council. "Some organisms can't survive, others move in — the ocean isn't a great big garbage can."

Few studies have tracked the environmental impact of dumping on Carlsbad's scale for a long period. It may be premature, at best, for MacLaggan to say that it "truly is a benign impact" compared with that of diverting water from waterways in Northern California to send south.

San Diego, which is more dependent on outside water than most populous California communities, may be the best location in the state for a big desalination project. Other jurisdictions, including Santa Cruz and five Northern California water districts, have taken a look at the technology and backed off because of its expense and environmental implications.

Assertions that desalination is an easy answer to California's water crisis should be taken with more than a grain of, well, salt.

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Michael Hiltzik's column appears Sundays and Wednesdays. Read his blog, the Economy Hub, at latimes.com/business/hiltzik, reach him at mhiltzik@latimes.com, check out [facebook.com/hiltzik](https://www.facebook.com/hiltzik) and follow [@hiltzikr](https://twitter.com/hiltzikr) on Twitter.

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