

A desalination boom in California could help it deal with 'exceptional' drought

Criticized for its high energy use and harm to marine life, new technologies such as reverse osmosis could make desalination a more effective way of extracting freshwater



A keyboard on the dry bed of the Almaden Reservoir in San Jose, California this February. Photograph: Marcio Jose Sanchez/AP

Adaptation to changing weather patterns is a principal driver that underpins a multi-decade opportunity when considering investments in the [water](#) sector.

As the increasing unpredictability of weather patterns leads governments and municipalities to look at new water infrastructure investments, drought-ravaged [California](#) could be a large potential contributor to the [19% annual growth expectations](#) in global desalination market.

With an approximate global capacity of nearly 80m cubic meters per day, about 1% of fresh water consumed globally is derived from desalination. Traditionally this technique has been associated with the oil rich Gulf States such as the United Arab Emirates, Kuwait and Saudi Arabia, where low energy costs have driven thermal desalination which is based on evaporation and the subsequent condensation of the steam as potable water.

Energy consumption, traditionally high with desalination, has been significantly reduced in the past two decades, partly due to the widespread uptake of reverse osmosis technology (RO). This process removes the salt by filtration, using membrane technology. RO now accounts for nearly 60% of global desalination capacity.

The International Desalination Association (IDA) has challenged the industry to achieve a further reduction of 20% in energy requirements for seawater desalination by 2015 – to be achieved through a combination of the integration of renewable energy, the use of lower pressure solutions and potential advances in membrane technologies.

Incumbent technology providers to the industry include membrane manufacturers such as industrial and chemical giants Siemens and Dow Chemical, as well as smaller players including Japanese group Kubota or US filtration membrane specialist Pall Corporation and the Treatment Technologies division of French water specialist Veolia Environment.

Other demonstration stage technologies are under development at institutions such as Stanford and MIT and aim to achieve similar desalination results with significant energy savings.

The US is currently the second largest global desalination market by installed capacity (led by RO) for industrial applications. However, in the last decade, the rate of capacity expansion in the US has fallen

behind Spain, Saudi Arabia (where 70% of all drinking water comes from desalination) and the UAE. But will this continue?

So far, California is enduring its hottest year on record, contributing to the state's worst level of drought in the past 40 years, according to a [report](#) this month from the National Climatic Data Center. Nearly one-third of the state is now in "exceptional" drought, witnessed in particular in the San Francisco Bay area, parts of Silicon Valley and the farmlands of central California. A [May report](#) from the University of California-Davis estimated that "water shortages would cause the fallowing of 410,000 acres, the loss of 14,500 jobs and cost the (agricultural) industry \$1.7bn in the state's most productive agricultural region". So what is being done? Historically, more water has been pumped from the State Water project, a facility comprising storage reservoirs, pumping stations and other canals which provide water supplies for 25 million Californians and 750,000 acres of irrigated farmland.

However, local authorities are turning to the potential of desalination, despite entrenched views about high costs associated with the technology. According to a 2013 study from the state Department of Water Resources, desalinated water typically costs about \$3 per cubic meter, approximately double that of water obtained from building a new reservoir or recycling wastewater. Meanwhile technological developments in reverse osmosis in particular, look likely to bring the cost down to less than \$1 per cubic meter, largely due to its lower energy requirement.

In California alone, 15 desalination projects are proposed along the coast from Carlsbad to Los Angeles and up to San Francisco Bay. In Carlsbad, Poseidon Resources is nearing completion of a \$1bn plant that is expected to produce up to 190,000 cubic meters (50m gallons) of fresh water a day, fulfilling about 7% of the region's water demand. This facility will lessen the region's dependence on the Colorado River and the Sacramento-San Joaquin River Delta, both increasingly unreliable in terms of supply.

Furthermore, in recent months, Santa Barbara's City Council voted to spend nearly \$1m to hire an engineering firm, law firm and lobbyist to try to restart the city's shuttered desalination plant by 2016, while in Monterey County, restrictions on withdrawals from the Carmel River have led American Water to begin studies into three possible locations to build a desalination plant to replace lost volumes. In Los Angeles, leaders of the West Basin Municipal Water District, which serves about 100,000 people, have built a pilot plant in Redondo Beach and are studying plans for a \$300m desalination plant by 2020.

The IDA emphasizes that environmental safeguards have become increasingly important in the location and permitting of new plants and that monitoring programs are being more widely utilized. Lower energy consumption also reduces a plant's carbon footprint, and in addition, new technologies are being used successfully to lessen disruptions to marine life during the intake and outfall processes. Studies such as the International Desalination Association's Blue Paper on Desalination and the Gulf have raised awareness of steps to leverage best practices and mitigate potential environmental effects of desalination.

Desalination is not a solve-all solution; it can harm marine life and remains costly. But as drought continues to affect water supplies internationally, it will be fascinating to follow the growth of this industry.

Simon Gottelier runs the water strategy at [Impax](#)

The water hub is funded by SABMiller. All content is editorially independent except for pieces labelled advertisement feature. Find out more [here](#).