

What about desalination?

With the tides of the San Francisco Bay filling the marshes of northern Santa Clara County, the question of tapping into a resource as close and as vast as the Pacific Ocean to produce fresh water is on the minds of many, especially in this time of drought.

Desalination is the process of removing salts from seawater or brackish water through distillation or filtration to produce fresh, drinkable water. This process is used in various arid regions around the world, from Israel to Carlsbad, CA.

In order to meet the water needs of Silicon Valley, the Santa Clara Valley Water District conducts long-term planning to evaluate all options and select alternatives that would best enable us to provide a safe, clean, reliable water supply. One of the options we have evaluated is desalination.

Bay Area desalination

The Santa Clara Valley Water District partnered with four other Bay Area water agencies to examine whether desalination was feasible in the region. The evaluation criteria included the quality of water that would feed a desalination plant as well as the cost of power and infrastructure improvements, review of permitting and water rights issues, public acceptance and environmental justice.

The most desirable location for a regional plant would be a site that has the lowest salinity feedwater which would require less energy to desalinate. The study found that a desalination plant near Pittsburg would be the most cost-effective and technically feasible. The site also offers source water that is generally brackish, with salinity well below that of sea water, thus lowering the treatment cost. Three South Bay sites were also evaluated for their suitability but the sites ranked poorly.

Earlier, the agencies built a small demonstration plant at the same site near Pittsburg to determine the feasibility of a larger-scale desalination operation. This small plant ran for one year to collect pertinent data for the agencies to consider the best options to pursue for their water supplies.

While desalination is under consideration here and has been developed elsewhere, currently the water district is investing in water conservation programs, expanding the use of recycled water and analyzing the quality of water coming from a pilot purified water plant that opened in 2014 to demonstrate what role purified water can play in meeting our region's future water needs.

Here's a brief look at the factors that must be considered for desalination to move forward.

Considering desal: environment, energy and economics

Environment

To desalinate water, the water first must be transferred from an ocean or brackish water source to the desalination plant. Once it is filtered, the treated water is moved through the water delivery system while the salts, solids and other matter, known as brine, that have been filtered out of the water must be properly managed.

The intake process and disposal of brine pose environmental challenges. Drawing water into a plant, depending on where and how it is done, can threaten marine life. Special precautions are necessary to avoid trapping and killing sea life. Special precautions are also necessary when disposing of the highly saline brine. If it is returned to the sea or bay, it needs to be done so carefully, so the super-salty water does not harm marine life.

Energy

The energy required in the desalination treatment process is also a major challenge. Filtering the salts and other compounds from sea water must be done at very high pressure, which requires a significant amount of energy. The impact to our carbon footprint must be considered in any proposal to develop a desalination plant.

Economics

Although the small demonstration plant near Pittsburg still exists, in order to provide a useful amount of water to the region, a larger, permanent plant would need to be built. The cost to build a plant that would produce 20 million gallons a day would be around \$200 million. It is currently estimated that this regional plant could provide about 5,500 acre-feet of water to Santa Clara County in dry years.

The ongoing cost of producing and delivering the water would be up to \$1,800 an acre-foot to Santa Clara Valley Water District. One acre-foot is about as much water used by two families of five in a year, or about 326,000 gallons.



Mobile desalination

Another option to investing in a permanent desalination plant is to deploy mobile desalination units, typically used by the military or emergency responders when water systems have gone offline, as during natural disasters. These units can provide up to a few million gallons per day of clean water and can be decommissioned when no longer needed, though they can often be more expensive than a permanent plant. These facilities are much like the “peaker” energy plants approved and operated during the California Energy Crisis. They require the same permits a permanent facility would need to operate, and would be subject to the same requirements mentioned earlier for safeguarding marine life at the intakes and for disposal of brine.

Cost comparison

Regional desalination at Pittsburg:

\$1,600 – \$1,800/acre-foot (AF)

In dry years, the Santa Clara Valley Water District would be allocated about 5,500 acre-feet per year. During wet years, the water district would not need to take desalinated water, but would still be required to pay a share of the capital costs for the facility.

Water conservation:

\$50 - \$500/AF

Non-potable recycled water (purple pipe):

\$300 – \$2,800/AF

The low end is for retrofits or simple extensions of the “purple pipe” system that carries recycled water to users for purposes such as irrigation or industrial use. The high end would be for significant improvements, such as additional pumping capacity or storage, bigger pipelines and additional treatment capacity.

Potable reuse of advanced purified water:

\$1,600 - \$2,000/AF

This is on par with desalination currently but could provide more water (up to 45,000 acre-feet per year) than a regional desalination project could.



Focus on water recycling and purification

While we keep desalination as a possibility in our water supply portfolio, the water district has been moving steadily forward with plans to develop potable reuse of advanced purified water. Most notable among these has been the operation of the Silicon Valley Advanced Water Purification Center, launched in 2014, which is improving the quality of non-potable recycled water and serving as a demonstration facility for water purification technology for potable uses.

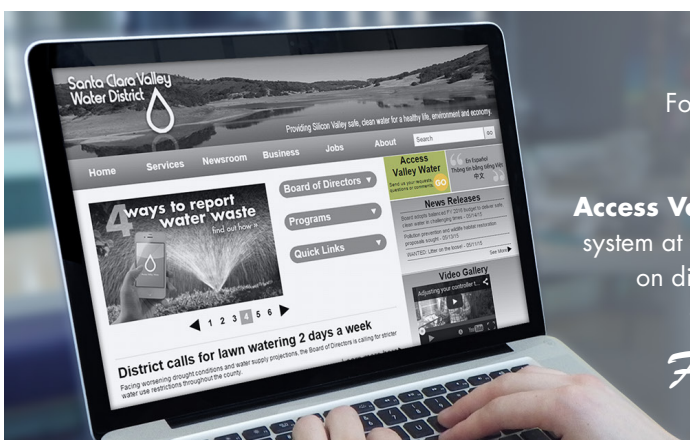
The focus on water recycling and purification takes a page from Mother Nature – all water on the planet is reused, and recycling water, just like recycling plastic and glass, is good for the environment. Recycling and purifying water allows the water district to be more nimble in responding to the drought by providing a drought-proof, locally controlled supply of water to meet our needs now and into the future.

The water district’s goal is to expand recycled and advanced purified water to meet at least 10 percent of total water demands by 2025, and to do that, we are partnering with cities, recycled water producers, and water retailers around the county. Specific projects range from non-potable recycled water (purple pipe) for landscaping and industrial purposes as well as projects that would use advanced purified water to replenish our groundwater basins for potable use. Through five proposed projects, we could deliver up to 45,000 acre-feet per year of additional water.

The 2014 voter-approved Proposition 1 Water Bond includes significant funding opportunities for potable reuse projects, further incentivizing the development of this future drinking water source.

The water district’s board of directors’ foresight years ago to develop the purification center has paid off. The plant opened during the drought and is providing not only additional water supplies but demonstrating that consistently high-quality water can be achieved through this process.

Learn more about the Silicon Valley Advanced Water Purification Center, visit www.purewater4u.org. We continue to evaluate desalination as an option to shore up our water supply in drought years. To learn more, visit www.regionaldesal.com.



CONTACT US

For more information, contact **Tracy Hemmeter** at **(408) 630-2647** or by email at **themmeter@valleywater.org**. Or use our **Access Valley Water** customer request and information system at valleywater.org to find out the latest information on district projects or to submit questions, complaints or compliments directly to a district staff person.

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