

Recycled water for drinking: Using purified water to replenish groundwater in Santa Clara County, California

Silicon Valley Advanced Water Purification Center, the largest plant of its kind in northern California, produces 30 million litres (8 million gallons) a day of purified water. The \$72 million facility receives treated wastewater from the neighboring San José-Santa Clara Regional Wastewater Facility and purifies it using microfiltration, reverse osmosis and ultraviolet light. The water district plans to store the water in aquifers as part of its larger groundwater replenishment program to meet the growing region's future water supply needs.

The drivers

Santa Clara Valley Water District is a water wholesaler providing water to 1.9 million residents in the southern region of the San Francisco Bay Area, including Silicon Valley. Currently, the water district is meeting its supply from the California State Water Project, the Central Valley Project, Hetch Hetchy Regional Water System, local groundwater, local surface water, recycled wastewater, and conservation measures.

More than 55 percent of water consumed in the Santa Clara Valley is imported from the Sierra Nevada watersheds. Imported and local surface water is stored in both reservoirs and underground aquifers through a managed recharge program. Due to a reduction in rainfall over the past four years, very little local water is flowing into the Water District's reservoirs and groundwater basin.

Due to the California's water shortage, the water district has directed much of its imported water directly to drinking water treatment plants instead of underground storage. The result has been a decline of 30-40 feet in the groundwater levels and increasing concerns of land subsidence.

The water district is working hard to prevent land subsidence. The agency is directed to: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."

Using purified water to inject into the groundwater basins, known as indirect potable reuse (IPR), is being actively pursued for groundwater basin management and to combat the risk of land subsidence.



The scheme at a glance

- Silicon Valley Advanced Water Purification Center opened in 2014 and produces 8 million litres of purified water a day.
- The water district is developing an overarching recycled water and infrastructure master plan for the County, which will incorporate individual master plans of the four municipal recycled water producers.
- The water district is investigating opportunities to partner with cities and investor-owned utilities around the county to purify recycled water for potable uses to replenish groundwater basins. Several projects are proposed that would percolate or inject purified water into groundwater basins, resulting in up to 45,000 acre-feet per year of additional water.
- California's State Water Quality Control Board is establishing the regulatory framework for Direct Potable Reuse schemes. A feasibility report is due back to the state legislature by the end of 2016 and preliminary regulations are expected to be in place few years after that.

The path taken

Gaining public support for recycled water

Surveys conducted over several years found that residents initially were not supportive of recycled water use but acceptance grew as more information was provided. With the Silicon Valley Advanced Purification Center now open, the water district provides regular public tours, and believes the current level of support is high.

A recent online poll on public support for drought measures found that 88 percent of the public either 'strongly favored' or 'somewhat favored' expanding the use of recycled water, and 58 percent of those polled said they would favor adding appropriately treated recycled water to their drinking supply.

Demonstration site

The Silicon Valley Advanced Water Purification Center was designed to serve as a demonstration site which includes monitoring and testing of the water quality to prove that the purified water produced at the plant could be used for potential potable reuse projects. Results are showing the water is of very high quality and can be used for indirect potable reuse.

Feasibility studies underway

Pre-engineering work and groundwater modeling studies are underway, and operations studies will follow suit. The studies, along with subsequent District Board approvals, are anticipated by 2018.

Public outreach efforts are being increased to raise public awareness and acceptance of potable reuse.

Call to streamline California Environmental Quality

Act

In April 2015, water district Board Chair, San José Mayor, Santa Clara Mayor, and Silicon Valley Leadership Group CEO, called for streamlining CEQA regulations and expediting the installation of water pipelines along existing city streets. The legislation was added to the state budget and signed by California's Governor Brown on June 24, 2015.

Construction

Construction of the five IPR projects is expected to begin in 2018 once preliminary studies and CEQA work is completed, Operation of a fully built system would likely commence by 2022.

Engaging the community

Engaging decision-makers, regulators and politicians

The water district held an opening celebration in July 2014 and is providing tours of the Silicon Valley Advanced Water Purification Center for major stakeholders, the media, and residents.

Several recycled and purified water committees have been established with representatives from municipal recycled water producers, city officials, water district board members and staff.

Stakeholder engagement included holding water and drought summits with local, state and national elected officials; working with the Santa Clara Valley Water Commission; briefings and tours for key elected officials; and a press conference with the Mayor of San Jose.

Engaging the community

A public outreach strategy was developed with public tours of the facility, information materials for adults, education resources for school children, and a speaker presentation program.

The site tour program plans to incorporate a "Taste Test" station at the Purification Center.

A website (<http://purewater4u.org>) and a virtual tour include information on purified water in the context of the urban water cycle. In addition, the site

provides information about what experts are saying and answers frequently asked questions.

The water district has partnered with an ethnic media organization, offering them tours of the facility which has resulted in greater media coverage.

Several local sports stadiums, including the new professional football stadium and soccer stadium, use recycled water and promote purified water at their games.

Success factors

Partnerships

Institutional partnerships for potable and non-potable reuse are important. A non-potable recycled water partnership between the city of Sunnyvale, Cal Water and Apple, Inc. was established to expand the region's recycled water program. Extending the recycled water pipeline will serve the new Apple headquarters in Cupertino, and help the water district take a step closer to meet their goal of increasing recycled water from 5 percent to 10 percent by 2025.

A partnership with the city of Sunnyvale is being explored to cost-share upgrading a wastewater pollution control plant and to develop an option for advanced purification processes to produce purified water for future potable reuse.

Academic institutions play a significant role. Many higher education professors bring classes to the Purification Centre for tours. A workshop, with academics, industry experts, and policy makers has been held on recycled water and the challenges it faces regarding public opinion.

Support by state government is critical. The voter-approved Proposition 1 Water Bond (November 2014) includes significant funding opportunities for potable reuse projects. These projects are being developed in many parts of the state but perhaps at no quicker pace than in Santa Clara County.

High level trust in water authority

In 2014, Santa Clara County was selected by the WaterReuse Research Foundation as one of two communities in California to evaluate for public acceptance of potable reuse. Focus groups and telephone surveys show that residents in the county have positive attitudes of the water agency with 45 percent having a favorable opinion, and 71 percent believed they are receiving high quality tap water. Further, when respondents were asked if they would support indirect reuse of recycled water in their community, 62 percent said they would either strongly support or somewhat support IPR.

Water quality monitoring and testing

The water district is closely monitoring and thoroughly testing the purified water produced, including contaminants of emerging concern (CECs) to demonstrate the safety and quality of the water.

Potable reuse testing workshops are reviewing data collected from the UV AOP and ozone-biofiltration pilots, with an independent advisory panel reviewing the sampling data. The project team has convened Reverse Osmosis Concentrate Management Alternatives workshops to explore viable alternatives for brine disposal.

The project team has participated in WaterReuse Foundation technical workshops on assessment techniques for evaluating and demonstrating safety of DPR, and blending requirements for water from DPR treatment facilities.

Moving to potable reuse

The water district is evaluating the potential for various potable reuse schemes and working with municipal cities and recycled water producers to evaluate financing opportunities, governance structures and policies affecting their respective jurisdictions.

Brine disposal is a challenge for regulatory agencies. Although there is general public support, water district staff are preparing to respond to public concerns that might arise from moving towards using purified water for potable reuse. Monitoring public perception and expanding public acceptance is ongoing.

Lessons learnt

- Timing is everything. Due to the ongoing drought, public acceptance is growing and political will has significantly helped to overcome obstacles and speed up the process of developing potable reuse projects in California.
- Use the news media to garner attention and influence decision-making. The water district has actively reached out to media outlets to inform them of the facility and its value, resulting in wide coverage by national and international media outlets. A joint press conference by municipal leaders was successful in gaining positive media attention and led to the passage of Senate Bill 88.

- Briefing and keeping elected officials informed is vital – different communities or areas see things in different ways. Gaining the support of respected opinion leaders can reduce potentially significant opposition and influence others in their community.
- Silicon Valley Advanced Water Purification Center has proven to be an excellent vehicle to increase public understanding of the treatment process and technology. The visitor center is building public interest and trust in the agency's capability by demonstrating the technology used to produce high quality water.
- Developing clear set of key messages and consistently conveying the value of potable reuse to the region's economic vitality and high quality of life has built support among influential leaders and is continuing to build support amongst the region's residents.
- Cost comparisons for ratepayers, showing recycled water and other supply options, are important and can be a driver for or against the project.

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