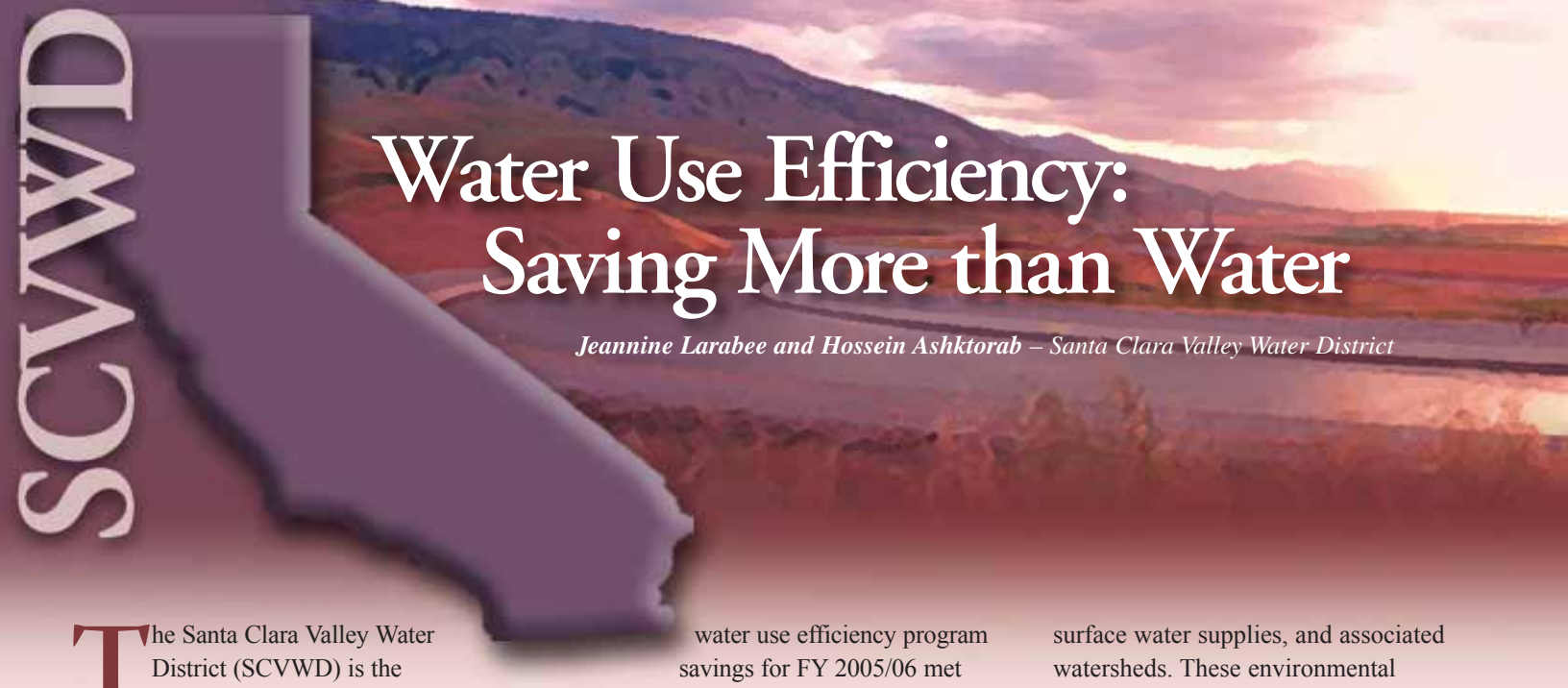


Water Use Efficiency: Saving More than Water

Jeannine Larabee and Hossein Ashktorab – Santa Clara Valley Water District

The Santa Clara Valley Water District (SCVWD) is the water wholesaler for Santa Clara County, California. It serves 15 cities, of which San Jose is the largest, with 1.8 million residents and over 200,000 commuters. SCVWD meets the county's water demands through a combination of local water (groundwater, surface water, recycled water, and water conservation) and imported water from the federal Central Valley Project and the State Water Project.

SCVWD places high priority on offering cost-effective, innovative water recycling and water conservation programs. Since these programs were initiated, water savings have been significant, but the benefits are far-reaching, and include substantial energy savings and reduced emissions of carbon dioxide and other air pollutants.

How Much Water is Saved?

SCVWD's water use efficiency programs, which include both water conservation and water recycling, reduce demands on existing water supplies and delay or eliminate the need for new water supplies for an expanding population. These effects are cumulative and increasing. Since the water conservation programs were implemented in FY 1992/93, a total of 300,000 acre-feet of water has been saved, with approximately 39,000 acre-feet saved in FY 2005/06 alone. Water recycling programs, implemented in FY 1998/99, have saved a cumulative 68,200 acre-feet, with 15,000 saved just in FY 2005/06. Combined, the SCVWD water use efficiency program savings for FY 2005/06 met around 15 percent of the total Santa Clara County water demand for that year.

The greatest water conservation savings are achieved through high-efficiency toilet and clothes washer rebate programs, low-flow showerhead distribution programs, and pre-rinse sprayer distribution programs (for food services). SCVWD's water conservation savings have increased each year due to expansion of and greater participation in these water conservation programs. Water recycling, or the use of treated wastewater for nonpotable applications, is used in a variety of ways, including for irrigation and industrial processes. SCVWD has established goals for water conservation to supply 92,000 acre-feet by the year 2020 and water recycling to supply 10 percent of total water use by the year 2020.

SCVWD has saved approximately 1.42 billion kWh since the inception of its water conservation and water recycling programs

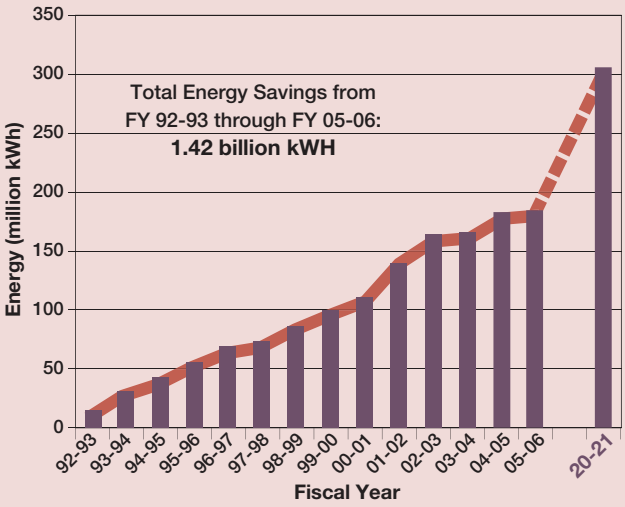
Besides the water supply management benefits of greater flexibility and increased reliability, the water use efficiency programs provide environmental benefits by helping protect the salt marsh habitat of South San Francisco Bay, local groundwater supplies, local surface water supplies, and associated watersheds. These environmental benefits in turn provide significant aesthetic and human health benefits.

Indirect Benefits: Energy and Air Quality

While the primary goal of the District's Water Use Efficiency programs is to use water more efficiently, ancillary benefits include energy savings and resultant air quality improvements. California's water supply chain, or the route water follows as it is pumped and conveyed from its source, treated to drinking water standards, distributed, used, and treated to wastewater standards, is energy-intensive. Fifteen to 20 percent of all energy consumed in the state is water-related. The State Water Project alone, a 444-mile long aqueduct transporting San Francisco Bay-San Joaquin Delta water to Southern California, consumes two to three percent of all electricity in the state because of the high elevations and long distances over which water must be pumped and conveyed (Wolff and others, 2004). Thus, reducing flow through the water supply chain by using alternative water supply sources such as water conservation and water recycling decreases energy use.

Electricity production by power plants using nonrenewable energy sources such as natural gas and coal generates air pollutants, including reactive organic gases, particulates, nitrogen oxides, sulfur oxides, all of which have adverse human health or environmental impacts, and carbon dioxide, a greenhouse gas that contributes

to global warming. Global warming and the climate changes that may result present many challenges for water agencies. For example, it is predicted that Northern California's water supply system will be altered by changes in precipitation patterns and an earlier snowmelt. A reduction in water-related energy demand due to water conservation and water recycling reduces these air pollutants and allows the district to respond to the water supply challenges posed by global climate change.



Energy savings from the SCVWD water use efficiency program (recycling and conservation).

Model Demonstrates Savings

Potential impacts of climate change on California's water and energy resources have brought together professionals from both industries with the shared goal of understanding the connections between water and energy in the state water supply system. As part of this effort, models and methodologies to determine the energy embedded in California's water supply system have been developed.

One such model, the spreadsheet-based "Water to Air Model," was developed by The Pacific Institute (Wolff, 2004). The model's whole-system approach for quantifying water-related energy use provides water supply planners with an overview of the energy intensity of different water supply options, allowing comparison of water supply scenarios. Users can input agency-specific water supply, energy use, and air emissions information, or use the default values. The model is user-friendly and customizable. SCVWD staff used this model to quantify the energy savings and air pollutant emission reductions garnered by the district's water conservation and water recycling programs. Two scenarios were compared:

- Continued use of current water conservation and water recycling programs; and
- No use of conservation/recycling programs; with the water that has been saved instead supplied by imported water.

Model results showed that SCVWD has achieved significant energy savings and air emissions reductions since the inception of its water conservation and water recycling programs. For 1992/93 through 2005/06, the district saved approximately 1.42 billion kilowatt-hours of energy (see chart above), equivalent to the annual electricity required for 207,000 households based on average California household use (California Energy Commission, 2006) and representing a financial savings of approximately $183 million. These energy savings eliminated the emission of approximately 335 million kilograms of carbon dioxide, which (according to the U.S. EPA's equivalency calculator) is the equivalent of removing 72,000 passenger cars from the roads for one year. Emissions of several other air pollutants were also reduced due to the energy savings from these programs, as indicated by figures for the period FY 1992/93 through FY 2005/06: reactive organic gases (20,900 kg), nitrogen oxides (146,200 kg), sulfur oxides (13,900 kg), and particulate matter smaller than 10 microns (25,700 kg).

Looking Ahead

Water conservation and water recycling programs clearly save energy and reduce air pollutant emissions. In the future, SCVWD will continue to offer its proven programs as well as develop new water use efficiency programs that have potential for both water and energy savings. The district also intends to continue to improve the energy efficiency of its operations, buildings, and practices because of its strong commitment to the efficient use of water and energy.

At the state policy level, the SCVWD supports the integration of energy and water policies, such as the passage of AB 32, the Global Warming Solutions Act, which requires California to cut its greenhouse gas emissions by about 25 percent by 2020. The district also encourages increased financial support from energy utilities as well as state agencies for water-use efficiency, particularly cold water conservation, because of the significant benefits to be gained in energy savings, air quality, and mitigation of the effects of global climate change.

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