

# How We Measure Water

*Fact Sheet #1  
Slides: All*

An acre-foot (AF) is a unit of measurement commonly used to quantify large-scale volumes of water, including the amount delivered to households and the amount available in bodies of water. One acre-foot is the amount of water necessary to cover one acre (e.g., almost one football field) to a depth of one foot. An acre foot is equal to 325,851 gallons or 43,560 cubic feet (1,233 cubic meters) of water.

A related measurement is an acre-foot per year (AFY). This measurement is used in many water-management agreements and water planning reports. One acrefoot per year is generally enough water to serve the needs of two households of five residents per household for one year.

## Gallons

The U.S. gallon unit of volume is used primarily in measuring daily water operations. The water flow over time is calculated in units of million-gallons per day (MGD). One million gallons per day (MGD) is approximately 1,121 acre-feet per year (AFY). The District operates three water treatment plants with a design maximum water production of 42 MGD (Penitencia), 100 MGD (Santa Teresa Water) and 80 MGD (Rinconada). The San Jose/Santa Clara Water Pollution Control Plant is designed to treat up to 161 MGD.

## Water Retailers Measure – CCF or HCF

One Hundred Cubic Feet (either CCF or HCF) is the volume unit most commonly used by water retailers to meter a home's monthly water usage. A home water bill generally is shown in CCF or HCF units.

|        |                                  |  |                  |
|--------|----------------------------------|--|------------------|
| Volume | Acre-Foot<br>(AF)                | To gallons (gal)                         | <b>325,851</b>   |
|        |                                  | To Hundred<br>Cubic Feet<br>(CCF or HCF) | <b>435.6</b>     |
|        |                                  | To cubic meters<br>(m <sup>3</sup> )     | <b>1,233.5</b>   |
|        |                                  | To liters (l)                            | <b>1,233,500</b> |
| Flow   | Million Gallons<br>Per Day (MGD) |  | <b>1,121</b>     |
|        | Gallons Per Min.<br>(GPM)        | Acre-Foot<br>per Year<br>(AFY)           | <b>1.614</b>     |
|        | Cubic Feet Per<br>Second (CFS)   |  | <b>724.5</b>     |
|        | Liters (l)                       |  | <b>0.4264</b>    |

In 2007, residents and businesses in Santa Clara County used approximately 400,000 acre-feet (357 MGD) of potable water. The average monthly water usage per household in San José was 15 CCF (11,220 gallons or .3 AF) and the current average cost was \$43 per month.

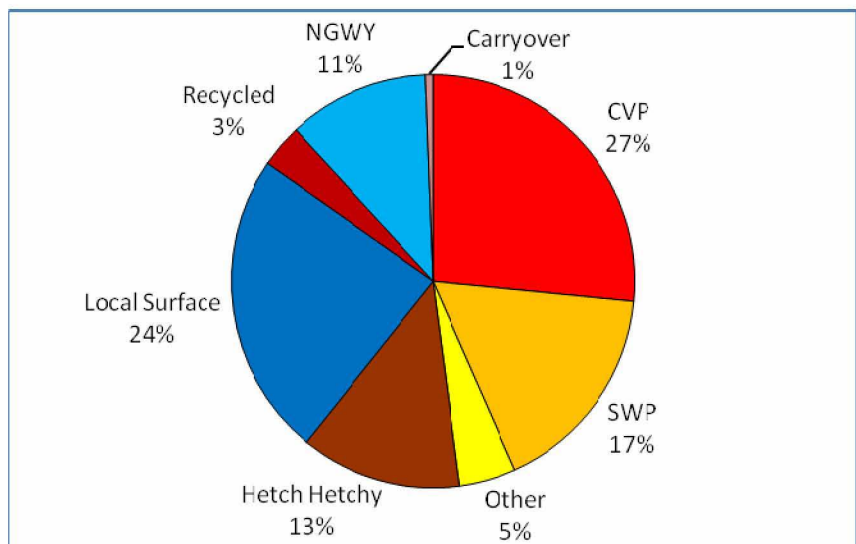
Water flow rates through streams are typically measured in cubic feet per second (CFS). Cubic feet per second represent the speed (fluid velocity) at which the water flows (approx. 7.48 gallons per second). Excessive water speeds can lead to pipe failures, stream bank erosion, and flooding. Typical District pipelines are operated at flow speeds of approximately 5 CFS, while stream flows are more variable. Real time local stream flow measurements are available on-line via the ALERT program, which is linked to 70 stream flow meters on the various streams throughout the county.

As the water management agency and principal water wholesaler for Santa Clara County, the District is responsible for planning to meet current and future demand for water for the county. The District does its water supply planning in collaboration with San Francisco Public Utilities Commission and water retail agencies in the county.

Water supply reliability includes the availability of water as well as the integrity of the infrastructure and systems that retrieve, store, transport, treat and distribute it. The District strives to meet water demand under all hydrologic conditions, including satisfying its treated water contracts for deliveries to the retail agencies and managing the groundwater basins so that water can be pumped from wells.

Water supply conditions change from year to year because of natural variations in hydrology. In addition, the District operates in an environment of uncertainty and must respond to institutional, regulatory and political risk factors that affect its ability to meet water demand. 2007 was a particularly challenging year with dry year conditions, legal challenges, and regulatory constraints on imported water supplies.

In May 2007, a federal court decision invalidated the Biological Opinion issued by the U.S. Fish and Wildlife Service for operation of the State Water Project (SWP) and Central Valley Project (CVP) with regard to an endangered species, the Delta Smelt. The court ruling, which imposes restrictions on pumping in the Delta, will be in effect until a new Biological Opinion is issued to guide the operations of the two water projects.



**Figure 1: 2006 Water Sources for Santa Clara County**

The court order has the potential to impact District water supply and operations in three key ways. It is estimated that overall deliveries will be cut by 10% to 25%, depending on the location of the Delta Smelt and river flow conditions. Secondly, because specific pumping reductions cannot be predicted, the two water projects can not finalize their annual allocations until later in the year, extending the period of supply and operational uncertainty. And finally, limits on Delta pumping will increase the draw on water in San Luis Reservoir,

which could exceed the allowable reservoir withdrawal rate. The District may be unable to meet immediate surface water demands under such circumstances.

All of these factors were taken into account to develop a probable range of scenarios and contingency plans for 2007 and 2008. The strategy will be continuously updated throughout the year to account for operations to date and real-time conditions.

As the region's population continues to grow, the demand for water will increase. A number of factors have to be considered to ensure that future water supply is reliable, including: climate change, environmental issues locally and in the Delta, more stringent regulations, aging infrastructure and the costs to develop other supplies. In the coming year, the District will update its Integrated Water Resources Plan to account for changing circumstances and new conditions.

The District manages and addresses risks and uncertainties by building a diversified portfolio of water supply alternatives. The portfolio of existing dry-year supplies and new water supply investments is intended to meet at least 95% of future water demands. To secure long term water supply, reliability, and regulatory certainty, the District continues to engage in statewide, regional and local collaboration and partnerships.

Furthermore, the District's long-term water supply planning combines sustainability principles with water resources and watershed stewardship planning. This robust, integrated approach provides a sound planning framework that maximizes protection and efficient use of existing resources while minimizing risks from uncertainties and stranded assets.

# Global Warming & Climate Change

*Fact Sheet #3  
Slides 13, 14, 17*

Global Warming is a term used to describe the heating of the Earth's surface from a buildup of specific "greenhouse" gases in the atmosphere. Like a greenhouse window, greenhouse gases allow sunlight to pass through the atmosphere, but then prevent heat from escaping. The greenhouse effect is a natural phenomenon that is essential to keeping the Earth's surface warm. Without it, there would not be life as we know it. It is the increases in specific greenhouse gases, such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), halocarbons, and ozone (O<sub>3</sub>)—mostly from burning fossil fuels—that are trapping excess heat in the atmosphere and are warming Earth's surface faster than at any other time in recorded history. It is a commonly accepted fact among reputable scientific institutions worldwide that the Earth's surface is warming. These institutions include the U.S. Environmental Protection Agency, University of Oxford, United Nations Environment Program (UNEP), World Meteorological Organization (WMO), US Climate Change Science Program, Okanagan University College in Canada, and more. The predicted increases in the Earth's surface temperature will significantly affect climate, public health, agriculture, snow accumulation and storage, water resources, sea levels, forests and landscapes, and glaciers.

**The Santa Clara Valley Water District and the City of San José are at the forefront of addressing global warming and climate change issues at the state and national level. The City and District have partnered with Sustainable Silicon Valley's CO<sub>2</sub> Initiative--a key strategy to respond to climate change resulting from the accumulation of human-generated greenhouse gases like CO<sub>2</sub> in Santa Clara County. Both agencies are taking action right now by changing the way they manage energy usage and optimizing operations to increase energy efficiency. In addition, joint water conservation programs have resulted in some of the biggest energy savings of any programs in the County.**

The terms *global warming* and *climate change* are often used interchangeably. However, there is a distinction. Climate change is a broader term that covers all the anticipated effects of climatic changes beyond just the rising temperatures implied by the term global warming.

Rising global temperatures are melting off the world's glaciers and the polar ice caps at an alarming rate. The resultant rise in sea levels is likely to have global consequences. Of particular concern to Santa Clara County is the potential for a catastrophic failure of the San Francisco-San Joaquin Bay Delta levee

system, through which about half of our annual water supply passes. Failure of these levees would not only decrease the quantity of imported water available to the county, but it would also increase the salinity of Delta water, adversely impacting water quality and Bay-Delta ecosystems. In addition, rising sea levels will also result in coastal flooding and increased saltwater intrusion into our groundwater basins. The effects of climate change extend beyond water supply concerns. Temperature and precipitation changes also affect plant life, potentially changing habitats resulting in further loss of some plant and animal species—some already endangered. In addition, flood protection structures may not be able to handle higher water levels and rising tides could overwhelm levees in the South Bay.

The above scenarios represent the potential impact of climate change over the next several decades. They present significant challenges that will be very difficult and expensive to overcome.

The Water District is addressing the climate change challenge and related uncertainties at two levels. The first, proactive, step is to change practices and increase efficiency so as to not exacerbate the problem. The second level is to specifically assess vulnerabilities and risks due to climate change and incorporate the results of the assessment into all District planning for water supply, flood management, business and strategic plans.

Over the past 15 years, the Water District led water conservation and recycling programs have saved over 1.4 billion kilowatts of energy, and reduced air pollution by an amount equivalent to removing 72,000 cars from the roads. In 2006, the District achieved 96% of energy use from renewable sources.

On Jan 29, 2008, the District Board of Directors passed a resolution that reaffirmed the Board's aspiration to:

1. Continue to exercise leadership in initiatives, programs and policies that address climate change while furthering the District's mission;
2. Apply understanding of climate change and related impacts as appropriate in water supply plans, flood management project plans, asset management and infrastructure plans, California Environmental Quality Act assessments and environmental impact reports, energy management plans, business plans, and strategic plans; and
3. Strive to minimize its greenhouse gas emissions related to utilization and management of water resources; and
4. Enhance community understanding of climate change and how it challenges the District's mission.

In addition, the Board adopted a set of policies directing the integration of change considerations into District planning and operations. It formed a Climate Action Team to facilitate the integration and furtherance of the District's mission and the newly adopted policies. Building on past successes, the District continues to provide a systematic framework for integrating mitigation and adaptation to climate change into all of the District's activities, which will include early or no-regret actions, refinements to existing operations, and identifying services/programs that needed expansion, and capital investments needs. Partnership, collaboration and knowledge-sharing and better decision support tools are keys for responding to climate change.

In May of 1995, the San José City Council adopted a resolution to participate in the Cities for Climate Protection Campaign sponsored by the International Council for Local Environmental Initiatives (ICLEI). The array of actions and activities that have followed are described below and have contributed to a reduction in greenhouse gases in addition to the City's energy programs. The emission reductions achieved as a result of the energy efficiencies within City facilities equate to reducing over 89,000 metric tons of carbon dioxide – equivalent to not driving more than 19,000 cars for one year -- or recycling 30,000 tons of solid waste instead landfilling it.

### **The goals of the 1995 campaign were to:**

- Strengthen local commitment to reduce greenhouse gases;
- Utilize management and planning tools developed by ICLEI to determine local energy use and develop strategies for conservation;
- Promote best practices to reduce energy use in buildings and transportation; and
- Enhance national and international ties through a collective voice for municipalities.

### **Within that adopted resolution, San José pledged to:**

- Incorporate the goal of greenhouse gas reduction in the policies and programs being pursued under the Sustainable City Major Strategy and sustainable city energy strategy;
- Review the variety of energy conservation and efficiency measures that the City is currently pursuing and assess the greenhouse gas reduction that will be achieved by each measure;
- Identify for implementation those measures that achieve significant greenhouse gas reductions; and
- Continue to advocate for energy efficiency and climate protection at the regional, state and national levels.

San José has fulfilled this pledge through the Sustainable City Program activities that occur throughout city departments. In particular, the City's adopted Sustainable Energy Policy and Action Plan contribute to that effort. The purpose of that policy is to create a community where energy is generated and used in the most sustainable manner possible. One of the goals within the Sustainable Energy Policy is to "Promote and achieve a cleaner and healthier environment, including improving air quality and reducing greenhouse gas emissions."

### **The City achieves this goal through policies and programs that:**

- Reduce petroleum consumption in municipal fleets through improvements in fleet fuel efficiency, the use of alternative fuel vehicles and alternative fuels.
- Reduce petroleum consumption in the private sector through improvements in fleet fuel efficiency, the use of alternative fuel vehicles and alternative fuels.
- Support and expand the City's Smart Growth policies which lead directly to improved air quality through reduced vehicle miles traveled.
- Reduce the urban heat island effect through the adoption of cool communities' actions.

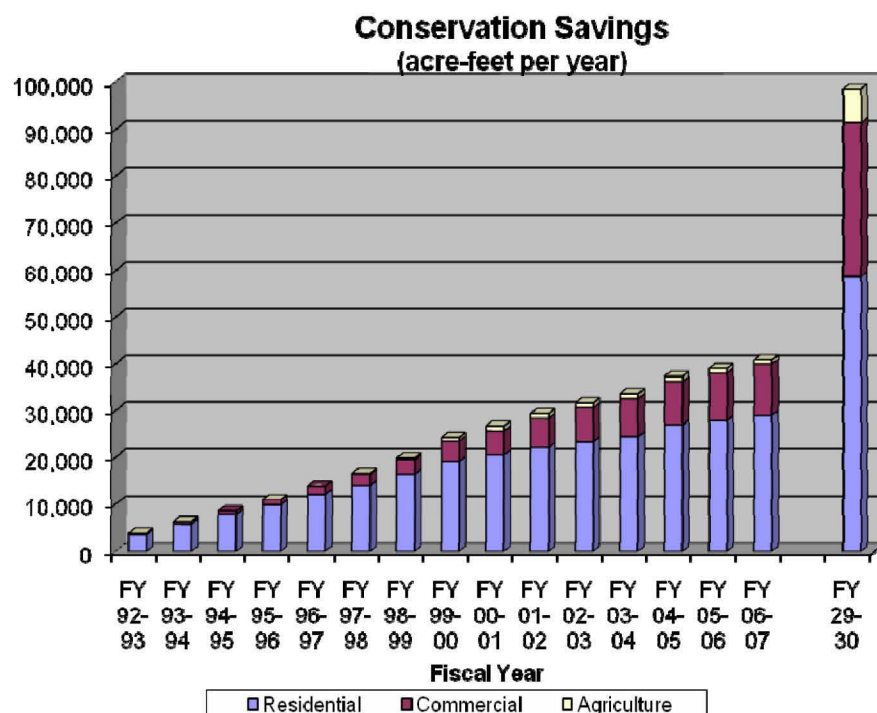




Water conservation, a program widely supported by the public, offers a variety of benefits countywide. Besides meeting long-term water reliability goals, water conservation programs help meet short-term demands placed on the water supply system during critical dry periods. Conservation reduces wastewater flows to Bay Area treatment plants, thus avoiding or deferring facility expansions while protecting the Bay’s salt marsh habitat. Water conservation also saves energy, thereby reducing air pollution and greenhouse gas emissions, and helps reduce the frequency of across the board conservation requirements (e.g.; last year’s request for 10% conservation) on water retailers and consumers.

Since FY 92-93, City indoor conservation programs, mostly funded in cooperation with the District, resulted in over 9,000 acre feet total of indoor water conservation throughout the Treatment Plant service area. Countywide, the District sponsored programs have achieved approximately 41,000 acre-feet per year of indoor and outdoor water conservation countywide (see chart below). These conservation efforts, as well as the efforts by the other cities and the water retailers, have resulted in a decrease in countywide per capita water use over time. Current per capita water use is below the per capita water use in 1987.

The District’s adopted goal for water conservation is 100,000 acre-feet by 2030. By comparison, annual conservation goals for other Bay Area water agencies range from 10,000 acre feet savings by 2050 (Contra Costa Water District) to 45,000 acre feet by 2020 (East Bay Municipal Utility District, which serves Alameda and Contra Costa counties).



As signatories to the California Urban Water Conservation Council's Memorandum of Understanding, the District and the City's Municipal Water System are obligated to implement a variety of urban water conservation programs. Additionally, under the Central Valley Project Improvement Act, the District is also required to implement various agricultural water conservation programs. Finally, due to the overall cost-effectiveness of water conservation, both the District's 2005 Urban Water Management Plan (UWMP) and its 2003 Integrated Water Resources Planning document call for significant conservation savings – 100,000 acre-feet by 2030 of which 70,000 acre-feet is expected to come from the current portfolio of programs and an 30,000 acre-feet will come from new initiatives (known in the District as the “No-Regrets” package). Achieving these goals will require considerable collaboration with local cities and state-wide initiatives.

The City funds conservation solely with Fund 513 (Treatment Plant Operating Fund), due to the flow reduction needs of the San Jose/Santa Clara Water Pollution Control Plant. Since the goal is to reduce flow to the Plant, the City only funds indoor water conservation programs throughout the tributary area. It does not fund any outdoor conservation. District conservation funding comes from wholesale water revenue and grants such as Prop 50 and Prop 13 funds and cost-sharing. Annually, the District secures from \$1 to \$2 million in grant funding and approximately \$500,000 to \$1 million in cost-sharing for conservation activities countywide. Cost-sharing leverages the amount each agency has to spend on its programs, thus making them more cost-effective.

The tremendous volume of water savings cited above is due to our joint successes in securing grant funding and cost sharing. The two agencies have engaged in a cost-sharing agreement since FY 1998. For instance, in FY 07-08, the City is helping to finance District programs with \$547,000 in cost sharing and the District is helping to finance the City with \$280,000 in cost sharing. The District portion is larger because it takes a bigger role in program administration at this point.

Equipment retrofits and replacements in residential and business settings are the primary means of achieving water conservation. Equipment replacements can include replacing pre-1992 toilets with High Efficiency Toilets that flush with just one gallon of water, replacing washing machines with high efficiency machines, replacing “pre-rinse sprayers” used in food service settings with water-conserving sprayers, and changes to cooling tower equipment. Considerable conservation potential lies in outdoor conservation as well (landscape irrigation, etc.).

The District and City currently implement over 20 different water conservation programs that use a mix of incentives and rebates, free device installation, one-on-one home visits, site surveys, and educational outreach to reduce water consumption in homes, businesses and agriculture. Further opportunities exist















































































