Public Health Impacts of Urban Water Conservation in California: Opportunities to Maximize Co-benefits and Minimize Harm

With Case-Study Analysis of Water Conservation In the City of Burbank

Final Report

Prepared by the UCLA School of Public Health
Health Impact Assessment Project
in collaboration with
The Los Angeles County Department of Public Health

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*About the UCLA HIA Project

Since 2001 the UCLA HIA Project has been working to advance the science and practice of health impact assessment in the U.S. Our multi-disciplinary team has conducted a wide range of health impact assessments on policies and projects, including HIAs of Living Wage laws, food and agriculture policies, education policies and transportation projects. Our work conducting HIAs, providing HIA training and technical assistance, and developing tools for HIA, including the HIA-CLIC website (http://www.hiaguide.org) has been generous supported by the California Endowment, the CDC Foundation, the Partnership for Prevention, the Pew Charitable Trusts, the Public Health Foundation, the Robert Wood Johnson Foundation and the Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts. You can find more about our work on our project website at http://www.ph.ucla.edu/hs/health-impact.

Technical Advisory Committee*

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Executive Summary (Burbank)

Setting and population

The City of Burbank is located 12 miles north of downtown Los Angeles on the eastern edge of the San Fernando Valley, surrounded by the cities of Los Angeles and Glendale. The climate is mild with summer average daytime temperatures in the 80's and winter daytime temperatures in the 50's. Average annual rainfall is 17.5 inches with most rain coming in the winter months. The average evapotranspiration deficit (the additional amount of water needed to support the area's average plant cover that is not supplied by available soil moisture) is 38 inches per year.

About one-quarter of the city's 17 square-miles consist of hilly open-space. The developed portion of the city is highly urbanized with a downtown core of high rise buildings, commercial zones on the south and southwest edges of the city, an airport and residential development in the remainder. While residential areas are predominantly low-density development, medium and high density residential development has grown considerably and its share of the city's housing stock is expected increase. The current population of 103,000 is expected to grow to nearly 117,000 by 2035 with most of the increase driven by an influx of new workers. Future housing is expected to be concentrated in mixed-use developments near transportation hubs.

Water system

Burbank Water and Power (BWP) is a city-owned utility providing water and electricity to city residents and businesses. BWP obtains water from local groundwater sources and imports water supplied by the Metropolitan Water District (MWD) from the State Water Project and the Colorado River.

Due to contamination with volatile organic compounds, chromium and nitrates, Burbank's groundwater undergoes special treatment prior to distribution. VOCs are removed by filtration,

but residual chromium and nitrates not removed by the treatment process are diluted down to levels below safety thresholds. BWP's blended potable water deliveries, totaling 16,500 acre-feet per year, average about 60% treated groundwater and 40% MWD water.

Water pricing

Water rates are tiered for BWP residential customers living in single-family structures with a top tier rate 55% higher than the rate charged for the first tier of usage. The price gradient for these tiers is relatively flat compared to the steeply tiered conservation pricing implemented by the Irvine Ranch Water District which has a top tier rate 700% higher than the bottom tier. The amount of water qualifying for the first tier rate, 1,500 cubic-feet per month, is also relatively generous. In Long Beach, for example Tier 1 usage is capped at 500 cubic-feet. Multi-family residential, commercial and industrial customers in Burbank do not have volume-based tiers. They are, however, assessed different seasonal rates with a summer rate twice that of the winter rate. All BWP customers are also assessed a flat "water availability charge" of $10.78 per month.

Water uses and trends[1]

Nearly three-quarters of the water delivered by BWP goes to residential uses (Figure ES2-1). Although Burbank does not have separate indoor/outdoor meters for residential customers, if patterns of residential water use are similar to the rest of the state, about 30% of BWP water is used for residential landscape irrigation.[2] Commercial water use comprises 20% of BWP water

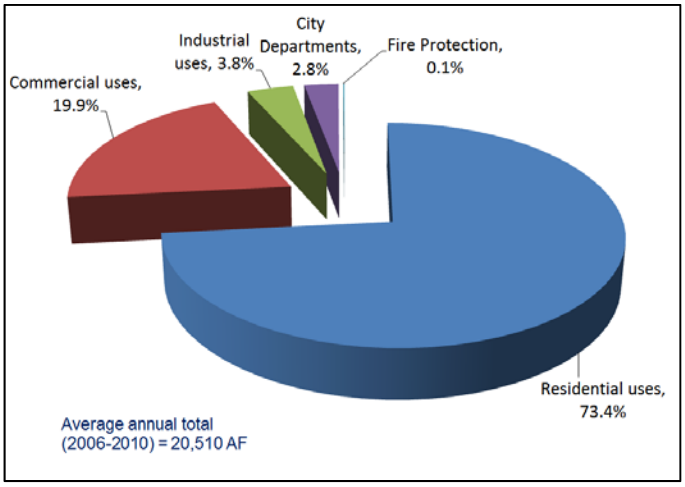

Figure ES2-1: Water uses in the City of Burbank (*2010 Urban Water Management Plan, Burbank Dept. of Water and Power*).

[1] Data from the Burbank Water and Power 2010 Urban Water Management Plan.

[2] Calculation assumes that landscape irrigation comprises 54% of water used by single family residences (DeOreo et al. 2011. California single-family water use efficiency study. http://www.aquacraft.com/node/63), water used for landscape irrigation in multi-family homes is about half that of single-family homes (Hanak E, Davis M. 2006. Lawns and water use in California. California Economic Policy (Public Policy Institute of California), 2(2)), 51% of Burbank residents live in multi-family housing.

deliveries. This includes water used for cooling office buildings and studios, landscape irrigation of commercial properties and irrigating golf courses.

Burbank's water demand decreased from 39 million gallons per day (mgd) in the 1970s to 19.6 mgd in 1999, as a result of economic shifts from manufacturing to services, shifts from single-family to multi-family housing, and conservation programs implemented during a series of droughts. Until declines in the last five years, water usage had held steady for the more than a decade at about 200 gallons per capita per day (gpcd).

BWP with support from a number of City ordinances aimed at promoting water conservation have helped to bring current per capita usage down to 156 gallons per day (2010) from a pre-2005 baseline level of 190 gallons per day. This achievement has also been supported by the economic recession and continued shifts away from manufacturing to services and from single-family to multi-family housing. Specific water conservation programs and achievements include:

- Green Home House Call Program: assisted over 1,600 homes in its first year and is credited with saving over 56 million gallons of water;

- Requiring all businesses (including owners of multi-family residential buildings) to verify installation of water-efficient plumbing fixtures. 90% compliance among 6,200 business customers after 9 months. Estimated savings of 231 million gallons (710 acre-feet) of water annually. Non-compliant customers were assessed a 25% water surcharge.

- Recycled water use
    - Recycled water used to irrigate all parks and large green spaces.
    - Recycled water from BWP is supplied to areas in Glendale and Los Angeles without access to recycled water from their own water agencies.
    - Burbank pays for permitting fees for commercial customers to connect to recycled water sources.

- System losses of only 2.2% (compared to the state average of about 10%) due to investment in high quality pipes, aggressive leak detection/repair, and soil and water with low corrosivity.

Despite these achievements, per capita water use in Burbank's water is mid-range compared to other cities in the region with similar climates and far above usage levels in the most water-efficient cities.

Table ES2-1: Per capita water use in Burbank and nearby cities, including comparisons with Prescott, AZ and Melbourne, Australia (both with noted water conservation programs)

City	CA DOE Climate Zone	SB X7-7 Baseline use* (gpcd)	2010 Water Use (gpcd)
Glendale	9	143	117
Los Angeles	8/9	152	128
Pasadena	9	210	150
Burbank	**9**	**195**	**156**
Irvine	8	258	214
Prescott, AZ (single family residence only)	Drier with hotter summer	--	98
Melbourne, Australia (residential only)	Similar	--	39

* Comparisons of SB X7-7 baseline usage levels may be misleading because utilities use different five- or ten-year windows to calculate averages for these baselines.

Summary

Challenges to continued water use reductions

Several factors will make it increasingly difficult for Burbank to continue its pace of water use reduction. Water use reduction always becomes more difficult over time as programs have progressively fewer "low hanging fruit" available for achieving reductions and a shrinking number of residents and businesses have water-wasting fixtures and applications that can be changed cheaply and easily. Because shifts in housing and business in the city will eventually stabilize, the winds behind the sails of conservation will slacken, making continued progress even more difficult. This does not necessarily mean that water consumption will increase, but rather that efforts to decrease water consumption below current levels are likely to involve more difficult and more expensive choices than they have been in the past. The legacy of groundwater contamination will continue to present a challenge to water conservation efforts and other water management decisions in Burbank, along with added costs.

Going forward Burbank does have a number of assets that facilitate water conservation, including:

- Compact development with relatively high land-use density;
- Strong support for water conservation from a proactive City Council;
- High proportion of residents in multi-family housing;
- Local water treatment/recycling capacity;
- Large commercial sector not dependent on water-intensive processes

Recommendations

1. Implement tiered conservation pricing

A steeply tiered conservation rate structure, similar to the "budget-based"[3] tiered pricing used by the Irvine Ranch Water District can greatly reduce water use, especially if accompanied by a robust public education program.

Health Issues: If adjusted for household size, a more steeply sloped tiered rate structure that is revenue-neutral relative to the current rate structure could benefit low income households since their per capita usage is more likely to be low. If not adjusted for household size, larger households could end up paying more for water under the current rate structure. If increased top-tier rates increase revenue, and if this additional revenue is used exclusively for conservation programs, as is the case in Irvine, the entire community would benefit from the added investment in water conservation.

2. Expand recycled water use for landscape irrigation, industrial use and groundwater recharge.

Burbank has substantial capacity to make greater use of recycled water for landscape irrigation and groundwater recharge. Expanded use of recycled water will reduce dependence on expensive, energy-intensive imported water. The city's compactness and

[3] Under a budget-based pricing system the amount of water qualifying for a particular block rate is determined in part by household size, property size and other factors determining household water needs. Simple tiered rates use fixed thresholds for determining the rate for each progressive tier of water use. (*See Box 5 -page 56)*.

land-use density will make it cheaper and easier to build out a recycled water distribution system than elsewhere.

Health Issues:

- Decreased air emissions associated with generating electricity to convey water (energy intensity of recycled water is much less than that of imported water)
- Small potential risk of disease transmission via recycled water could be minimized for residential landscape irrigation if regulations are amended to allow for recycled water use in sub-surface drip irrigation for non-turf landscaping.
- Groundwater recharge with highly treated water could improve the quality and sustainability of groundwater sources.

3. **Require new construction to have dedicated meters for new indoor/outdoor water use and submeters for each unit in new multi-unit housing**

   Separate indoor and outdoor meters would give better information to customers about how they can reduce water use and allow levying separate rates for indoor use and outdoor water use. Requiring them for new housing units would add minimal additional cost to new construction.

   Sub-meters for each unit in new multi-unit housing would allow residents to track their water use and take action to reduce use. If water costs are incorporated into rent payments residents have little incentive to conserve water. Sub-metering also prevents charging water-conserving households for the water used by households that don't conserve.

   Health Issues: Health benefits from added mechanisms to incentivize conservation. Split indoor/outdoor metering, if accompanied by lower rates for indoor water use, could benefit cost-sensitive low income households for whom high costs now constrain beneficial indoor water use.

4. **Implement new filtration and bioremediation technologies as they become available for removing contaminants (VOCs, chromium, nitrates) in order to more cost-effectively expand groundwater use without relying on dilution with MWD water**

Management of groundwater contaminated with VOCs, chromium and nitrates will play a leading role in decision-making about water use and conservation in the city. Currently VOCs are filtered out and chromium and nitrates are diluted down to "safe" levels using expensive imported MWD water. Changes in concentrations of these contaminants and changes in what are deemed to be "safe" levels could radically alter risks and the costs of control strategies. New membrane and biofiltration technologies may offer cost-effective solutions to these problems that were not available in the past. Improved filtration will improve Burbank's ability to safely and sustainably utilize its groundwater resources and help address health concerns with "diluting to safety" as a management approach, particularly with hexavalent chromium, for which safety thresholds are in flux.[4]

Health Issues: Decreased health risks associated with residual contaminants of drinking water. Cost impacts, which could strain operational resources and/or increase reliance on expensive imported water, are difficult to determine. Higher treatment standards will result in higher costs to achieve required levels of treatment, but recently developed technologies offer some prospect for controlling these cost increases.

5. Pursue desalination only as a last resort

In the 2010 Urban Water Management Plan BWP mentions desalination as a potential future source of water, but that it was not currently being pursued due to cost and environmental issues. Air emissions from power stations providing energy for the energy-intensive desalination process make this an unwise alternative from a public health perspective, unless no other option is available. Water conservation measures and expanded use of recycled water can balance water demand and supplies in a way that generates fewer negative health and environmental externalities and even some benefits.

[4] California Department of Public Health. 2014. Chromium-6 in Drinking Water: MCL Update (webpage). Updated January 30, 2014. http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chromium6.aspx