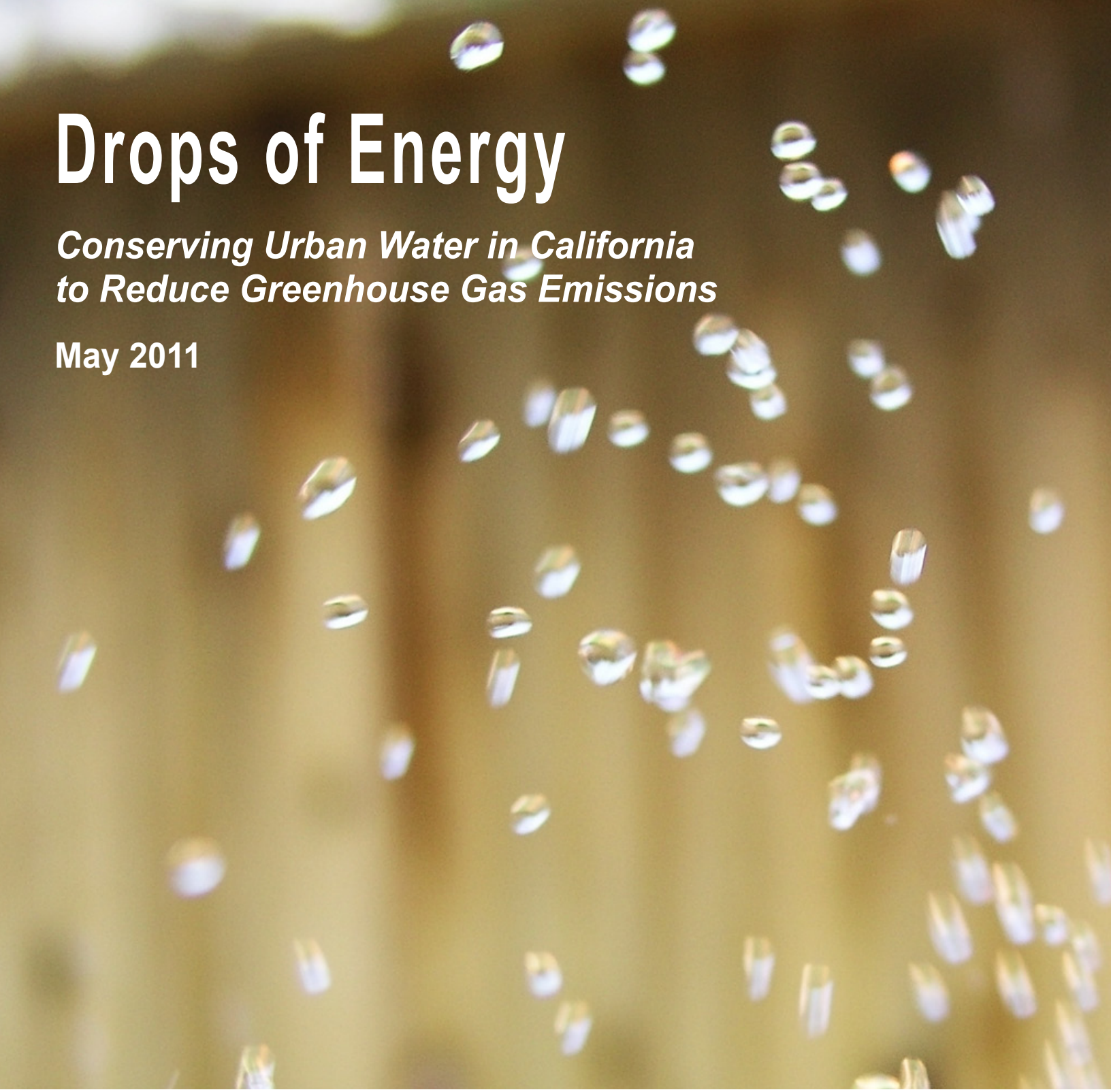

Drops of Energy

Conserving Urban Water in California to Reduce Greenhouse Gas Emissions

May 2011

Bank of America

BerkeleyLaw
UNIVERSITY OF CALIFORNIA
Center for Law, Energy & the Environment

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About this Report

This policy paper is the seventh in a series of reports on how climate change will create opportunities for specific sectors of the business community and how policy-makers can facilitate those opportunities. Each paper results from one-day workshop discussions that include representatives from key business, academic, and policy sectors of the targeted industries. The workshops and resulting policy papers are sponsored by Bank of America and produced by a partnership of the UC Berkeley School of Law's Center for Law, Energy & the Environment and UCLA School of Law's Environmental Law Center & Emmett Center on Climate Change and the Environment.

Authorship

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Executive Summary: Expanding Water Conservation in California

Water use means energy use. The state pumps and treats water and consumers use water in energy-intensive ways, such as through water heating and pressurizing. Consequently, the consumption of water in California requires approximately 20 percent of the state's electricity, 30 percent of its non-power plant natural gas, and 88 million gallons of diesel fuel annually. The greenhouse gas emissions associated with water-related energy consumption total more than 100 million metric tons of carbon dioxide-equivalent gases, while the burning of carbon-based fuels to power the state's water infrastructure releases particulate matter that can cause asthma and other health effects. Conserving water therefore means conserving energy and limiting pollution.

Water conservation is also critical as an adaptation strategy in an era of climate change. Climate models predict – and the state has already begun experiencing – altered precipitation patterns, dwindling snowpack, and unpredictable water supplies. In addition, rising sea levels from global warming and glacial melting threaten to inundate coastal groundwater supplies and sever critical links in the state water infrastructure. As a result, the state's residents will need to make better use of less water.

Because not all types of water use have the same impact on energy use, the suite of conservation strategies that may work best for agricultural water use may look different from those appropriate for urban water use. This paper focuses on urban water use, defined as usage by residents, non-farm businesses, industries, and municipalities. According to the California Energy Commission, urban water use consumes more than 70 percent of the energy associated with water supply and treatment and almost 80 percent of the energy (electricity and natural gas) associated with end-uses of water.

Top Four Barriers to Conserving Water in California & Solutions to Overcome Them

To address the challenges of conserving urban water, a group of water experts, public officials, water district managers, environmentalists, and business leaders gathered at the UC Berkeley School of Law in October 2010. The group identified the key obstacles to conserving water to save energy and offered recommendations for policy-makers and water conservation advocates. The group identified four key barriers facing water conservation efforts:

1) Lack of Financial Incentives to Conserve: many water rate structures do not encourage conservation and may offer relatively low returns for consumers investing in efficiency technologies.

2) Insufficient Data: the lack of adequate data about water consumption throughout the state's water infrastructure and among end uses poses a challenge for policy-makers trying to determine the most appropriate conservation measures for each situation and to help water users understand their consumption habits.

3) Lack of Consumer Awareness: many consumers are unaware of their water use and the energy savings associated with water conservation in their communities, residences, and businesses.

4) Lack of Funds for Water Efficiency Measures: many water consumers lack access to capital to invest in water efficiency improvements, such as improved piping, water recycling, and more efficient water-consuming equipment, such as appliances, process equipment, and landscape irrigation.

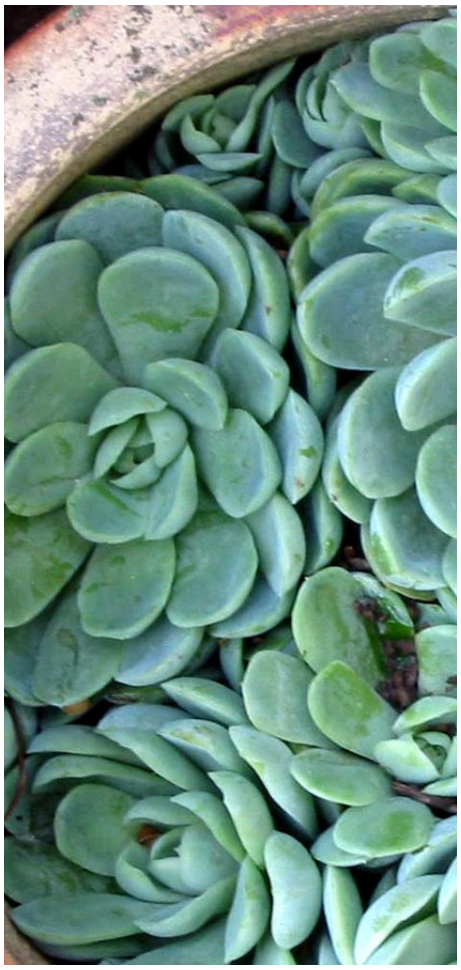
Short- and Long-Term Solutions

To overcome these challenges, this paper identifies short- and long-term actions that advocates, government leaders, public and private water suppliers, and other agencies should consider taking to advance statewide efforts to reduce water consumption, save energy, and ensure future water supplies. Policy-makers, with the encouragement of water conservation advocates, can:

- Promote local water districts efforts to implement rate structures, such as a budget-based system or inclining block rates, that encourage and reward water use efficiency;
- Monitor and publicize water consumption data, through existing local water purveyors, other regional and state agencies, and state and national organizations like the California Urban Water Conservation Council, the California Department of Water Resources, and the Alliance for Water Efficiency;
- Coordinate a comprehensive and well-funded statewide marketing campaign to encourage water conservation and water use efficiency as a way of life, following the example of efforts like the Save Our Water and Flex Your Power campaigns; and
- Expand efficiency funding programs from the energy sector to water consumers, such as a public goods charge, joint water and energy conservation incentives, and on-bill financing, to help consumers pay for water efficiency improvements.

These recommendations and others are summarized below.

Water Utilities



Implement a budget-based system or tiered or inclining block rates to encourage conservation by setting customer benchmarks and increasing rates on excess consumption

Consider other water-conserving rate structures such as time-of-use (where feasible) or seasonal rates that would increase rates during dry summer months, and charging more for water used for discretionary purposes such as ornamental landscaping.

Encourage water recycling and efficiency measures like xeriscaping (landscapes and gardens that do not require irrigation)

Coordinate rate schedules and incentives with wastewater treatment agencies based upon the avoided costs of water supply and capital and operating expenses for wastewater treatment and disposal

Provide real-time information about water usage to educate consumers about benchmarks for efficient use, customer averages, and personal consumption information as part of the billing cycle, if feasible, in order to link consumption patterns with cost and to encourage conservation

Integrate conservation program funding into water sales and service connection fee models, such as through a public goods charge on water consumption, to fund local water use efficiency programs and incentives

Allow customers to finance water conservation improvements through "on-bill financing," which provides upfront funds from the utility that consumers repay through their water bills at low, tax-exempt interest rates

Consider appropriate efficiency efforts ahead of purchasing new water supplies in developing water management portfolios

Utilize water efficiency experts to focus conservation efforts on high-volume water users and to work with businesses to audit and reduce their water and energy consumption

State Leaders

Develop standards and metrics for water consumption efficiency data and assist local water agencies with metering technology, the collection of data at critical consumption points, and the development of key metrics, such as the volume of water in and out (when feasible), the building type and size, occupancy, hot or cold water usage, the total amount of water consumed, and the potable and nonpotable water potential.

Centralize the data processes in an agency with enforcement powers and guidelines for data collection

Make the data searchable by the public in anonymized form to avoid violating privacy rights

Provide resources and deadlines for comprehensive water metering technology in coordination with existing state law on water consumption reporting and on eligibility for state water supply grants

Consolidate a statewide marketing campaign to encourage consumers to conserve water

Coordinate state outreach with federal efforts to encourage water and energy efficiency, such as the United States Environmental Protection Agency's Energy Star and WaterSense programs

Ensure that the marketing campaign relies on coalition partners to develop a diverse stakeholder group, including energy and water conservation organizations, labor, and business groups.

Encourage water utilities to integrate conservation program funding into their fee structures, such as through a public goods charge

Encourage local governments to implement Property Assessed Clean Energy programs to allow consumers to finance water efficiency improvements through property assessments that repay municipal governments for the funds expended

Water Conservation Advocates

Ensure that nonprofit carbon accounting firms provide accurate carbon credits for water efficiency to encourage businesses to undertake water conservation measures

Support and participate in a coordinated statewide marketing campaign to encourage water conservation and enlist the help of energy conservation organizations, labor, and business groups.

California Needs to Conserve Water to Reduce Greenhouse Gas Emissions and Adapt to a Changing Climate

Why Water Conservation Saves Energy and Greenhouse Gas Emissions

In an average year, California receives an estimated 200 million acre-feet of water from precipitation, with more than half of this water either absorbed by the natural environment or evaporated. Humans harness the remaining 40 to 50 percent for three major uses: urban (11 percent), agriculture (48 percent) and managed and stored environmental supply (41 percent).[1] Even though the agriculture sector consumes more water overall, most of the energy consumption from water results from urban use. This disparity results in part from the more intensive water treatment processes for urban users but also due to their more energy-intensive end uses, such as dishwashers and hot water heaters.

Recent studies indicate that the use of water in California represents approximately 20 percent of the state's electricity demand and consumes 30 percent of its non-power-plant natural gas and 88 million gallons[2] of diesel fuel.[3] The greenhouse gas emissions associated with this energy consumption total more than 100 million metric tons of carbon dioxide-equivalent gases.[4] The electricity use contributes to air pollution and hinders the state's effort to fight climate change and reduce its greenhouse gas emissions. As the California Air Resources Board has documented, the electricity plus the commercial/residential energy sector is the second largest contributor to greenhouse gas emissions, contributing over 30 percent of the state's emissions (see Figure 1).[5]

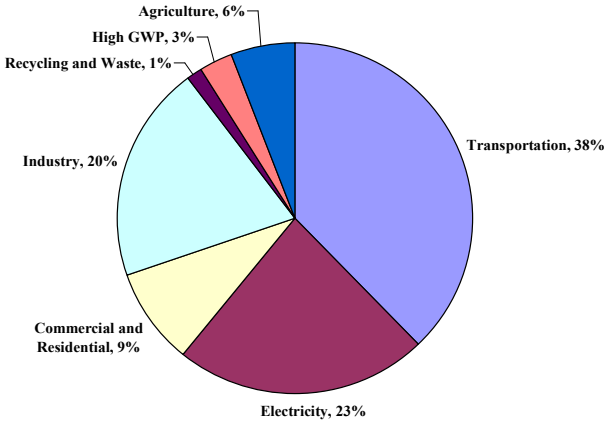


Figure 1. California's Greenhouse Gas Emissions (2002-2004 Average)

Source: California Air Resources Board

Electricity consumption associated with water use results from the energy required to pump and treat water, to treat, dispose and reuse wastewater, and to operate machines that use water in homes and businesses. Water pumping constitutes a significant percentage of the overall energy demand associated with water. The pumping is necessary because nearly 70 percent of the state's total stream runoff is north of Sacramento, while 80 percent of the water demand is south of Sacramento.[6] To convey the water from the north to the south, California has built a vast system of pumps, aqueducts, and dams, called the State Water Project (see Photo 1).[7] The system, which moves water over the Tehachapi Mountains in the southern end of the Central Valley into Southern California, constitutes the single largest source of electricity demand in the state,[8] with an average annual net energy use of 5.1 million megawatt hours (where one megawatt is roughly equivalent to the energy required to power 750 homes for a year).[9]

After pumping, water treatment, both before and after use, requires significant energy generation. Urban customers need water that has been treated both

Photo 1. Oroville Dam in Butte County, where the California State Water Project officially begins

Source: California Department of Water Resources

before use to make the water potable and after use to treat the sewage and toxics. Water used for agricultural purposes involves less treatment because plants and animals do not require potable water.[10] However, both types of water consumption require significant energy outlays (although the state's water infrastructure also generates a significant amount of hydropower from dams).

Urban water efficiency efforts could yield substantial energy and greenhouse gas savings

Energy savings from urban water conservation will help California reduce air pollution and limit greenhouse gas emissions associated with energy production. California has committed to reducing its greenhouse gas emissions that cause climate change, most directly through the California Global Warming Solutions Act of 2006 (AB 32). AB 32 requires the state to roll back its greenhouse gas emissions to 1990 levels by the year 2020, equivalent to a 30 percent cutback from the business-as-usual scenario projected for 2020.[11] In addition, former Governor Arnold Schwarzenegger's Executive Order S-3-05 calls for an eighty percent reduction from 1990 levels by 2050.[12] The California Air Resources Board, charged with implementing AB 32, recommends a 4.8 million metric ton reduction of carbon dioxide-equivalent emissions from the water sector.[13] As part of the strategy for achieving this goal, the agency cites the need for "water system and water use efficiency and conservation measures."[14]

The state government and a number of non-governmental organizations have developed water conservation plans and related data that document the substantial energy savings possible with reduced water use, although these plans require additional policy measures to be implemented. In 2008, as part of the effort to restore the Sacramento-San Joaquin Delta, Governor Schwarzenegger directed state agencies to develop a plan to reduce statewide per capita urban water use by 20 percent by the year 2020, which became the 20x2020 Water Conservation Plan.[15] SB 7x7 (Steinberg) codifies the 20 percent per capita water use reduction for urban residents by 2020, directing the state's Department of Water Resources to develop a stakeholder and regulatory process to meet these targets.[16] The plan's proponents concluded that "efficient use also can reduce water related energy demands and associated greenhouse gas emissions" and noted that the conservation effort in the fully implemented plan could "reduce emissions by 1.4 million metric tons per year."[17]

Non-governmental organizations have noted similar energy and greenhouse gas savings from various proposed plans to conserve water. In 2005, the California Urban Water Conservation Council (CUWCC) documented that the state could save more than 27.5 billion gallons of water per year and more than 234 million kilowatt hours of electricity if the water agencies that pledged to institute best management practices for water actually implemented the quantifiable measures. The Council also estimated that the avoided costs of implementing these measures over their lifetimes would total more than $200 million.[18] Similarly, the Pacific Institute calculated that California could reduce current in-state demand for water by six-to-eight million acre-feet per year (between 1.9 and 2.6 trillion gallons), equivalent to roughly 20 percent of statewide use, through existing, cost-effective technologies and practices.[19] The organization estimated that these

conservation measures would reduce statewide electricity use by 2,300 gigawatt-hours and natural gas use by 87 million therms annually. The annual energy savings would be equivalent to the electricity used by 309,000 California homes.[20]

Urban water conservation offers the greatest energy-savings potential

Of the approximately 20 percent of the state's electricity use associated with water, urban water usage constitutes more than 70 percent of the electricity associated with water supply and treatment (7,554 gigawatts for urban compared to 3,188 gigawatts for agriculture) (see Figure 2) and almost 80 percent of the electricity associated with end-uses of water (27,887 gigawatts for urban end uses to 7,372 gigawatts for agriculture) (see Figure 3).[21] As a result, policy makers should focus on the energy savings benefits associated with urban water consumption.

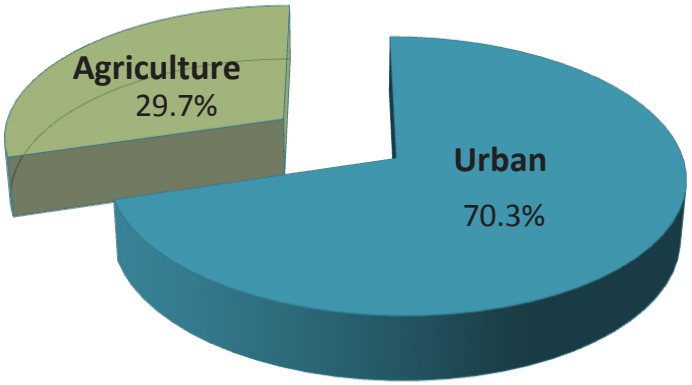


Figure 2. Total Electricity Use Associated with Water in California
Source: California Energy Commission

Specific geographical regions of the state and types of water uses may yield higher energy savings from water conservation than other areas and uses. For example, water conservation in Southern California will generally yield more energy savings from pumping and treating water than conservation efforts in Northern California, where water requires less energy to travel.[22] In addition, indoor water use generally offers the greatest energy savings because indoor users require wastewater removal, treatment, discharge, and energy-intensive water pressurization to lift the water to higher-altitude communities or for uses above the ground floor. Indoor use of hot water is particularly energy intensive due to the energy required for hot water heaters. Finally, conserving outdoor water use can save energy associated with pumping, treatment, and delivery.[23]

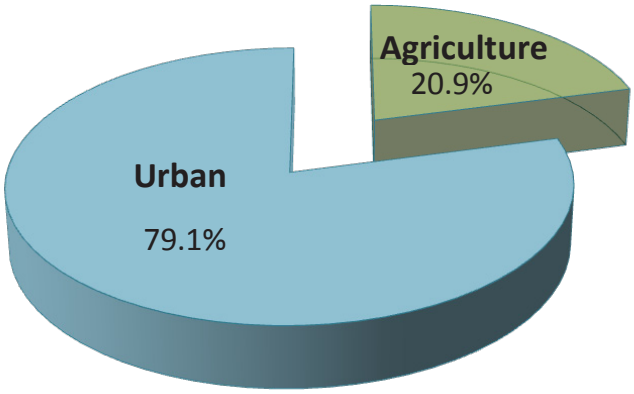


Figure 3. Total Electricity Use Associated with the End Use of Water in California
Source: California Energy Commission

Water conservation measures should coordinate with energy efficiency efforts. Many water-consuming appliances also use electricity and other energy sources, and water conservation advocates can often address the energy efficiency of a specific end use while simultaneously improving its water use efficiency. The California Energy Commission noted that "significant untapped potential for energy savings exists in programs focused on water use efficiency" and that water efficiency programs could achieve 95 percent of the agency's energy savings agenda at 58 percent of the cost.[24] A previous white paper in this series, which covered the related subject of energy efficiency retrofits in existing buildings (see *Saving Energy: How California Can Launch a Statewide Retrofit Program for Existing Residences and Small Businesses* [25]), discusses energy efficiency policies that could also help reduce water consumption.

Water Supplies Will Dwindle and Become More Difficult to Manage With Climate Change

Water conservation and increased efficiency will become critical as the state faces a future of water shortages due to climate change and increased population. The effect of climate change on water supplies in California is already apparent. Snowpack in the Sierra Nevada Mountains, which provides the critical source of water for most communities in the state, has decreased by 10 percent in the last 100 years, [26] with projections that it will continue to decline as much as 40 percent by 2050.[27] The 2009 California Climate Adaptation Strategy report predicts that the state "should expect overall hotter and drier conditions with a continued

reduction in winter snow (with concurrent increases in winter rains), as well as increased average temperatures, and accelerating sea-level rise" (see Figure 4).[28] The reduction in winter snow means that water management will become more difficult: most California communities depend on runoff from yearly established snowpack to provide water during the dry months of summer and early fall. As the report notes, "With rainfall and meltwater running off earlier in the year, the state will face increasing challenges of storing the water for the dry season while protecting Californians downstream from floodwaters during the wet season."[29]

Global sea level rise associated with warming temperatures will also threaten water supplies. Sea level rise has already caused an eight inch recorded increase at the Golden Gate Bridge over the past century.[30] Surging ocean water may compromise coastal groundwater supplies by increasing their salinity.[31] Rising sea levels also threaten to inundate the Sacramento-San Joaquin Delta, which provides a critical link in the State Water Project to move water to Southern California.[32] Repairing and protecting the system will be costly. According to a report cited by the California Air Resources Board, water supply costs due to scarcity and increased operating costs could increase as much as $689 million per year by 2050.[33] Water conservation will therefore become a critical adaptation strategy in anticipation of a future of dwindling and less reliable water supplies.

Water Use Efficiency Will Help Reduce the Need to Provide New Supplies of Water

Water efficiency improvements will help reduce the need to develop new water supplies or infrastructure. These improvements will enable California to meet future demand and address the diminished water supplies caused by climate change. In addition, water use efficiency can be more cost effective than procuring new water supplies that require extensive treatment or infrastructure investment. Finally, efficiency provides energy savings and fewer carbon emissions. The Pacific Institute notes that its water efficiency plan would require an initial investment of $1.87 billion, with a $185 per acre-foot savings for agricultural users and $99 per acre-foot net savings for urban users over the lifetime of the improvements. By comparison, new water storage projects can be significantly more expensive. For example, the proposed Sites Reservoir north of Sacramento may carry a $3

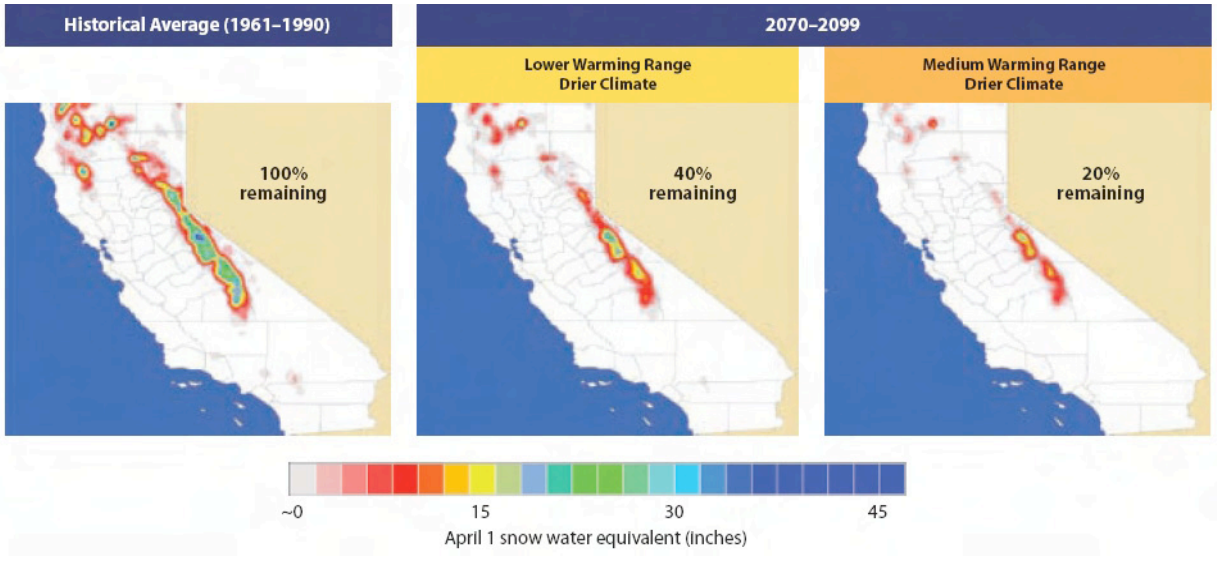
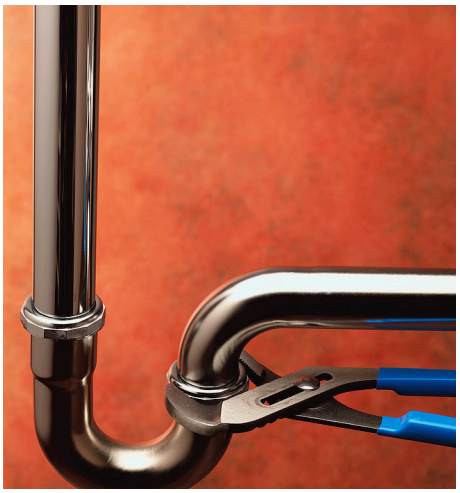


Figure 4. California Historical and Projected Decrease in April Snowpack, 1961-2099

Source: California Natural Resources Agency

billion capital cost alone,[34] with a $490 per acre foot cost when factoring expenditures to transport the water.[35] Finding new water supplies through ocean desalination is even more costly, both financially and environmentally, due to the significant energy use involved.



Recognizing the economic value of conservation, policy makers have prioritized water efficiency and reduction efforts. In addition to the 20x2020 plan discussed above, the state government passed AB 1420, which requires state grant and loan funding for urban water suppliers to be conditioned on the suppliers adopting best management practices for conservation.[36] Local water districts throughout the state have also adopted their own conservation plans for customers. The plans range in scope and effectiveness from targeted efforts to address periodic drought conditions to more comprehensive programs that have led to more efficient customer water use. These efforts represent a promising start to address the challenges, although additional local and statewide action will still be required.

Barrier #1: Lack of Financial Incentives to Conserve

Some water rate structures do not encourage conservation. As a result, many home and business owners lack the incentive to invest in technologies or behavior changes that reduce consumption. In addition, businesses have difficulty receiving credit for the carbon reductions associated with water conservation, which dissuades them from investing in these measures.

SOLUTION: Develop Water Rate Structures and Carbon Accounting to Encourage Water Conservation

Water providers and carbon accounting firms can provide greater financial incentives for conservation. Water agencies should pursue tiered volumetric- or budget-based rates that would discourage consumption during peak hours of the day or consumption beyond what the property or business reasonably requires. These rate structures could encourage customers to conserve water. Models exist throughout the country, including block rates that raise water rates during periods of peak water demand and allocation-based rates that set reasonable water consumption targets for each customer, based on factors such as the property size and outdoor area. The Irvine Ranch Water District provides one example of allocation-based rates. In addition, third party carbon monitoring organizations, such as The Climate Registry, should ensure that their existing greenhouse gas quantification methodologies for calculating carbon adequately credit reductions associated with water conservation. Businesses wanting carbon credits will therefore be encouraged to reduce water usage.

"We get a very poor return on investment because water is so cheap. If you go to your CFO, and the person in front of you has a great return on investment for their project, and you ask for $5 million for a project that takes 7-10 years to get the money back, guess who gets the money?"

-- Victor Muñoz
Safeway

Water providers should implement budget-based systems or inclining block rates

Water utilities should consider implementing or expanding rate structures to encourage water conservation. The Irvine Ranch Water District's program could serve as a model for budget-based systems. The program allows for property-specific water budgets and tiered pricing that gives customers an economic incentive to use water more efficiently. The program establishes a base water allocation for each consumer, based upon indoor per-capita needs and factors such as the property size, outdoor area, and weather conditions. The district then sets a charge per unit of water consumed within that allocation. If the customer exceeds the allocation, the district imposes "conservation charges" on each increment of water beyond the base allocation. Some critics have noted that such a system may unfairly benefit large-lot residents, although large-lot residents will still pay more for water overall than small-lot residents. As a result of this program, which began in the early 1990s, the Irvine Ranch Water District experienced a significant drop in water consumption, including a 61 percent reduction in average water use for landscaping between 1992 and 2005.[37]

Water utilities should ultimately consider implementing rate structures that are tailored to their community's needs. As an alternative to budget-based systems, water utilities could consider instituting inclining block rates that charge consumers more money for more water used. A number of water agencies have established tiered rate structures that have helped encourage and reward customers to move to lower rates through behavior and technology-driven water conservation savings.

Water districts should consider time-of-use or seasonal rates

In addition, water districts could consider implementing time-of-use rates to discourage inefficient consumption during times of peak demand. This type of rate structure would likely reduce overall demand. If metering technology does not yet exist to make this a cost-effective tool, water districts and other stakeholders should expand investment in metering technology with time-of-use rates as a goal. Other methods for encouraging conservation through rates include charging more for discretionary water use such as ornamental landscaping and implementing seasonal use rates that would increase during dry summer months.

Water rates should encourage water recycling and other efficiency measures

Water providers should consider lowering rates when consumers purchase recycled water or adopt water efficiency measures. "Recycled" or "reclaimed" water means purified wastewater that is often used for irrigation, industrial cooling, or to replenish groundwater aquifers. Water reuse has become more common in California, with some water agencies charging the same for potable and recycled water and many businesses investing in recycled water. An incentive-based rate structure may encourage more consumers to utilize this source of water. In addition, rate structures could encourage consumers to adopt efficiency measures, such as on-site reuse and turf replacement to remove lawns in favor of low-water landscaping.

Water districts should coordinate rate schedules and incentives with wastewater treatment agencies

Water districts and wastewater treatment agencies should coordinate the development of rates and financial incentives for water efficiency based upon the avoided costs of water supply and capital and operating expenses for wastewater treatment and disposal. Wastewater agencies may be willing to contribute to water conservation and efficiency efforts as a means to avoid having to invest in wastewater expansion efforts. Improved efficiency will reduce discharges for water agencies, which can save them and their ratepayers money.

Water districts and wastewater treatment agencies should also coordinate their forecasting and investments. This coordination could help avoid situations where a wastewater treatment agency begins investing in expansion plans at the same time that the local water district launches an efficiency campaign that would decrease wastewater. The setting of water-efficient rates by water providers may provide an opportunity for water districts to coordinate with wastewater agencies, which also set rates that can be adjusted with the suppliers. Finally, where feasible, wastewater treatment plants should consider implementing volumetric pricing of wastewater based upon metered indoor water volumes to provide additional incentives to conserve potable water use.

Carbon accounting nonprofit firms should ensure that businesses undertaking water efficiency steps receive credit for the resulting carbon reductions

Many businesses rely on credit for their carbon reductions that result from

improvements to their energy usage through efficiency measures. These credits not only have public relations value but also financial value as offsets in both the voluntary carbon offset markets and the compliance markets associated with emerging cap-and-trade programs. However, the independent nonprofit organizations that verify carbon reductions do not directly recognize water usage reductions as resulting in carbon reductions. As a result, businesses face less incentive to invest in water efficiency measures. These nonprofit organizations should develop accounting principles to reward businesses for the carbon reductions associated with reduced water usage.

Workshop participants cited the need for the Greenhouse Gas Protocol Initiative, a partnership of the World Resources Institute and the World Business Council for Sustainable Development Protocol,[38] which sets international standards for carbon accounting and greenhouse gas inventories, to update its classification of corporate water conservation measures. The project sets the accounting framework for many offset providers around the world, including The Climate Registry and the Climate Action Reserve. The initiative currently classifies water conservation measures as part of its "Scope 3" product life-cycle emissions and corporate-level category of carbon reductions. According to some workshop participants, this category does not provide accurate credit for carbon reductions associated with water conservation. The initiative is planning to revisit the Scope 3 guidelines, and water conservation advocates should participate in the process to encourage accurate recognition for water conservation measures.

"There's a methodology for carbon accounting, and we should use the existing NGO process. But Scope 3 is not necessarily recognized for carbon reductions, and water is just thrown into it."

-- Anthony Ravitz
Google

Barrier #2: Insufficient Data About Water Consumption

Many policy-makers, regulators, and the general public may be unaware of either the energy savings associated with water or the rate of water consumption in their communities and businesses. As a result, consumers have difficulty recognizing the benefits of water conservation and may be unaware of the most efficient methods of reducing consumption. Policy-makers also need comprehensive data about water use throughout the state in order to target conservation programs on the areas most likely to yield substantial benefits with the lowest costs.

SOLUTION: Develop Statewide Data Collection Process

State leaders should continue to coordinate water use data monitoring and collection among retail and wholesale water purveyors, with a goal of improved and standardized water consumption metrics. The state should also work with interested stakeholders to create and maintain a centralized database of information on water consumption. Existing state agencies are already collecting much of the needed data through a variety of state reporting requirements, such as the submissions of Urban Water Management Plans to the California Department of Water Resources, water right reporting to the State Water Resources Control Board, and filings with the Department of Health. The California Urban Water Conservation Council also is collecting specialized and detailed water conservation data for its members. The state should centralize and expand these efforts.

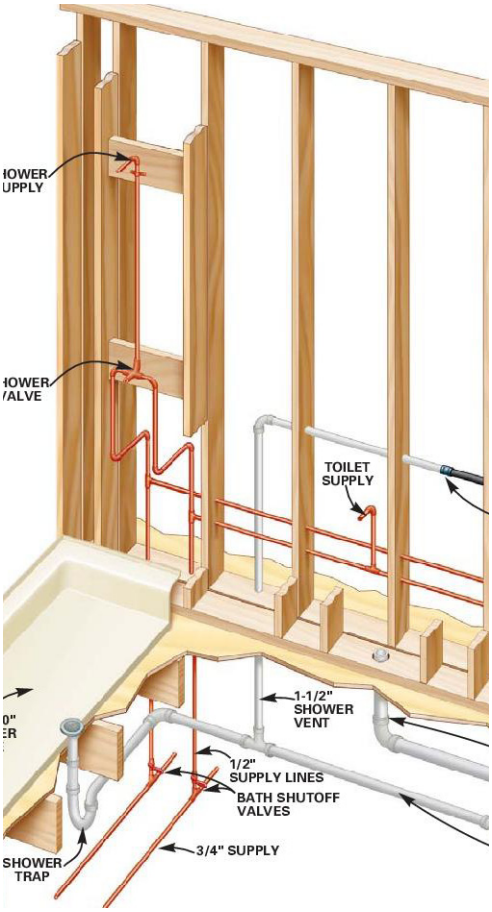
"I hired a company to go to six of our stores and put flow meters on every outlet. The data we got back shocked me. We were all wrong about our water consumption. But we learned where we have inefficient use of water and where the opportunities are. It was embarrassing but also exciting."

-- Victor Muñoz
Safeway

The state should develop standards, benchmarks, and metrics for water consumption data

Accurate, comprehensive, and timely data on water consumption would have multiple benefits. The energy sector has experienced advances in metering technology with some application to water utilities. Referred to as "advanced metering infrastructure," "automated meter reading," or "smart meters," these technologies allow consumers and utilities improved access to real time and historical water use to help identify when and how much water is being consumed, as well as opportunities for efficiency improvements. The data would enable better cost-benefit water planning, identify anomalies in the system, prioritize and inform policies and implementation efforts, identify conservation potential for customers, and provide a mechanism for customer feedback about the rate of consumption and impact of that consumption.

The state government should develop a standardized method of collecting data on water use throughout the state. In order to have accurate data, water districts will need to install meters and submeters at the point of end use, where feasible. In addition, the state should consider metering water use consistently at all critical points in the water cycle where possible, including along key supply and conveyance stations, water treatment plants, distribution outlets, reclaimed and recycled water points, discharge and wastewater treatment plants, and



wastewater collection facilities. State leaders should specify the protocol for water managers to report the data.

The data should include a number of key metrics where feasible. Such metrics could include the volume of water in and out; the building type, size, and occupancy; its hot or cold water usage; the total amount of water consumed; and the potable and nonpotable water demand and potential. In addition, the data could be sector-specific to include indoor and outdoor use and agricultural versus urban. State officials organizing the results should utilize a weather normalization analysis that will enable data comparisons among different regions and different years, given that temperatures fluctuate from year to year and among regions. For building specific information, the reporting could be in addition to the water data collection module on the United States Environmental Protection Agency and Department of Energy's Energy Star Portfolio Manager benchmarking tool. The water management reporting process could also be modeled on the Energy Star energy module.[39]

Geographic information systems (GIS) may assist the data collection process. GIS uses a set of tools to collect and analyze data for specific locations. Advances in satellite imagery and computer technology could make this form of data collection resource efficient. It could also obviate the need for more intensive forms of on-site collection that may raise privacy concerns among individual customers.

State leaders should make the data searchable for the public without violating privacy rights

Once collected, the state agency should devise a method of publicizing the data and allowing easy customer access to it. For example, the data could be presented on a website with interactive calculators and real-time, hypothetical scenarios for pricing and calculating future consumption. This information will help set water consumption benchmarks for customers and allow them to compare their water usage to their peers and to historic data.

In publicizing the data, the agency will have to contend with privacy issues related to water consumption. For some businesses, water consumption data will be proprietary – potentially trade secret or subject to public criticism. The agency will therefore have to balance these concerns with the need to make data accessible to the public. One solution may be to aggregate the data among multiple users in a given area to minimize the risk of revealing any one consumer's usage.

Water utilities should provide real-time information about water usage to educate customers about their water consumption and how it compares with their neighbors

Water utilities should provide consumers with relevant real-time information about water use, when feasible. This information could also include users' consumption patterns and expenses, as well as the aggregate consumption of their similarly situated neighbors or regional consumption averages. Customers need this information early in the billing cycle, where feasible, in order to understand the connection between their behavior and consumption patterns and to adjust accordingly. Customers would therefore develop a better sense of their consumption patterns and could benchmark their usage to their neighbors.

State leaders should centralize the data processes in an existing agency with a mandate for enforcement and guidelines for data collection

Workshop participants differed in their recommendations for which agency should collect and publicize the data. Some recommended a retooled California Water Commission, while others suggested the California Urban Water Conservation

Council, California Department of Water Resources, State Water Resources Control Board, or Department of Health, among others. The agency would serve as a central authority to receive current reports of water usage and could have a legislative mandate to report the data and enforce proper monitoring. The agency would manage the data, verify the accuracy, and make them available to the public. The state could provide consistent and comprehensive data reporting guidelines for all water agency staff and reporters.

In order to carry out this mission, the agency will need computer systems capable of handling data collection, staff time to collect the data, and an enforcement mechanism to ensure proper and timely collection to meet reporting requirements. The effort could become part of a larger statewide initiative to compile, model, predict, and present environmental quality data in general, as envisioned by a recent UCLA School of Law report.[40] Consolidating environmental data collection efforts, including water consumption data, could lead to cost savings for the state.

State leaders should consider providing funds and deadlines for metering water

To jumpstart the data collection process, the state should consider dedicating its financial resources for water districts to expand comprehensive water metering and conservation measurement efforts, perhaps using applicable state bond funds. This effort would support the recent state mandate under AB 1420 that requires districts to provide the data within the SB 7x7 framework in order to qualify for funding incentives.

Barrier #3: Lack of Customer Awareness

"It gets complicated when you're talking about ice cubes in the refrigerator, end-use energy to chill it, embedded energy to bring it there. The message should be, 'use less water and less energy.' Just a simple message."

-- Lynne Galal
Pacific Gas and Electric

Participants at the workshop observed that many consumers are unaware of the energy benefits of conserving water, as well as the various methods for conserving water. They often do not know the energy ramifications of pumping and treating water and also may be unaware of the energy consumption of various end uses that involve water, such as washing machines and dishwashers. Both residential and business customers often do not focus on water consumption. While numerous water districts around the state have created conservation outreach efforts, the state needs a coordinated voice to promote the water supply and energy benefits of more efficient water use, as the state has done with the Flex Your Power and Save Our Water campaigns.

SOLUTION: Develop and Implement an Outreach Program to Advertise the Benefits of Water Conservation

Consumers need customer-focused information on water conservation methods and benefits. The state should coordinate a statewide outreach effort that joins the various campaigns underway among various water districts and that synchronizes with federal outreach efforts. California's 20x2020 Water Conservation Plan launched the joint Association of California Water Agencies-California Department of Water Resources public outreach campaign entitled "Real People, Real Savings." Stakeholders should join and strengthen the effort.

"When you turn your sprinklers on, there's energy in there. People don't understand, whether in Virginia, Massachusetts, or California, that there is energy in that water."

-- Bill McDonnell
Metropolitan Water District of Southern

The State should coordinate a consolidated and location-specific marketing campaign to encourage consumers to conserve water

Various water utilities and state agencies have launched education and marketing campaigns to encourage water conservation. However, these efforts lack coordination at the state level and also fail to convey the energy component involved in water consumption. The California Water Commission, among other agencies, could assist with this task. The campaigns could also benefit from idea-sharing and the utilization of successful marketing techniques employed by other jurisdictions.

Participants recommended that the campaign utilize straightforward messaging about the personal and environmental benefits of water conservation, using simple and colorful advertisements and relying on focus groups and professional media consultants. The anti-tobacco campaign run by the California Department of Health Services during the 1990s could provide a model, as well as the innovative public relations campaign launched by Denver Water.[41] The campaign could also involve a strong climate change component, highlighting the impacts of global warming on snowpack and the limitation of existing above-ground storage to capture sufficient water.

The campaign should also be tailored to specific geographic locales and markets.

For example, the campaign could provide specific scenarios of the impact of water shortages on different media markets. Advocates could also offer residents and businesses within various markets specific suggestions for how to save money from water consumption.

"Water bills are sophisticated in Europe, showing customers their baseline water consumption. We need our water bills to be visual and colorful and show people their energy use and greenhouse gas emissions."

-- Workshop Participant

State leaders should coordinate the outreach with federal efforts on energy efficiency

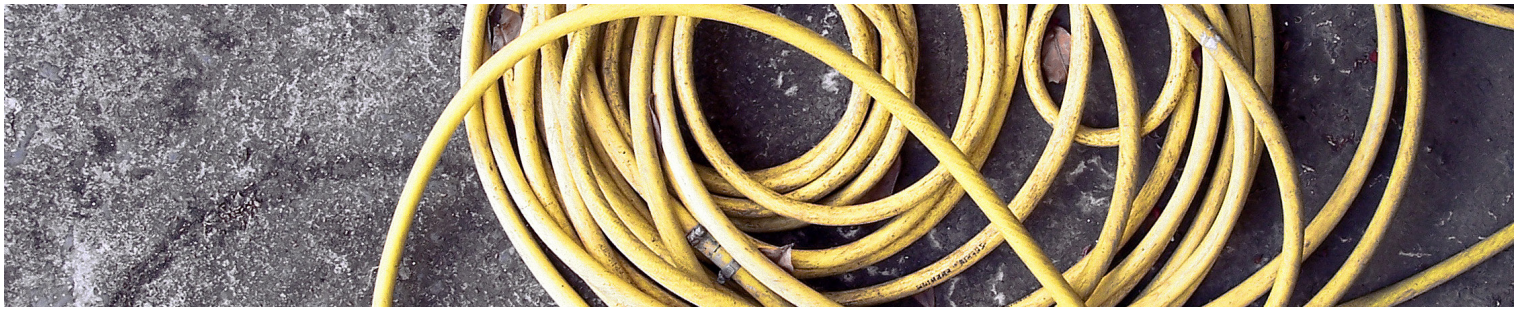
Existing federal programs to improve energy efficiency could synchronize with state efforts. A state agency could take the lead to coordinate a statewide campaign with federal efforts, such as the Energy Star and WaterSense programs, which work with businesses to develop consumer-oriented labels for water-efficient products.[42]

The marketing campaign should rely on coalition partners to develop a broad-based effort

A strong outreach campaign on water conservation should include diverse stakeholders, such as energy and conservation organizations, labor, and business groups. The stakeholders could ask community leaders to serve as spokespeople to communicate the importance of the issue, from youths and religious leaders to health care providers and military veterans. The grassroots campaign should train local ambassadors to communicate effectively to the media and policy-makers.

"There are a variety of ways to communicate to customers and help them prioritize and make better decisions. If they replace their 1.6 gallon toilet, how much water will they save? How much carbon?"

-- Anthony Ravitz
Google



Barrier #4: Lack of Funds for Water Efficiency

Implementing water efficiency measures in a home or business can cost money. New equipment, such as more efficient water-consuming appliances, or new water delivery infrastructure, such as piping, can be expensive and time-consuming to adopt. As a result, even if water customers are aware of the benefits of conserving water, they may lack available funds to invest in efficiency technologies and products. Businesses that have funds to invest may be reluctant due to low rates of return on their investment. Water agencies may also lack funds to support efficiency efforts.

SOLUTION: Expand Existing Financing Mechanisms and Implement a Public Goods Charge on Water

State leaders should expand existing financing structures to include water efficiency measures. For example, water ratepayers could finance efficiency improvements through loans from their water providers that they repay through on-bill financing. The Property Assessed Clean Energy program also allows homeowners and commercial building owners to finance improvements through municipal financing that they repay through property tax assessments. In addition, the state could encourage water agencies to integrate conservation program funding into their rate structures, such as a public goods charge on water ratepayers. Water agencies can also direct water efficiency experts to target large consumers and prioritize investment in efficiency efforts before purchasing additional water supplies.

"There is a perception among city council, boards, and commissions that big companies have big money and should be green on their own, and that we shouldn't have to subsidize them."

-- Bill McDonnell
Metropolitan Water District of Southern California

State leaders should encourage water districts to adopt on-bill financing for water efficiency improvements

"On-bill financing" programs allow water utility customers to finance water efficiency measures through their water bills at low or no interest, with the upfront money provided by the utilities. The program already exists for electricity customers.[43] Water conservation advocates should ensure that this program is expanded to all water customers (a pilot program is currently underway in Sonoma County[44]). These customers could then invest in new water-efficient appliances and infrastructure and pay for them over time through their utility bill. The savings from the upgrade may be greater than the additional repayment amount.

In order to implement the program for water, water providers will first need to address the challenges raised by electric utilities that have considered adopting on-bill financing for residential customers. These utilities expressed concern that offering the program to residents may place the utilities in violation of consumer credit lending laws. In order to avoid this liability, water districts should work with financial institutions that already comply with applicable lending laws to provide the financing, with the water districts becoming the vehicle for delivering the payments.

State leaders should encourage water districts to integrate conservation program funding into water sales and service connection fee models
The state should authorize and encourage water providers to place a surcharge on water customers, such as a public goods charge, to fund water efficiency measures. The AB 32 scoping plan recommends a public goods charge for water,[45] and the precedent for such a charge exists for electric utilities. In 1998, as part of the state's effort to restructure the electricity market, state leaders developed a surcharge for all electric utility customers to finance energy efficiency programs, renewable energy development, and assistance for low-income residents. Its example should be instructive for water efficiency.

The California Public Utilities Commission and the Water Energy Subgroup of the Climate Action Team (WETCAT), an advisory group for AB 32 implementation, have been investigating the parameters of a public goods charge to be administered by the state.[46] Although workshop participants disagreed about whether the state or local water providers should administer the public goods charge, local providers can still either implement a public goods charge themselves or support state efforts to develop state or regional plans. The state can also require water providers to implement such a charge and to dedicate the revenue to funding water efficiency improvements.

State and local government leaders should encourage use of Property Assessed Clean Energy funds for water efficiency improvements
The Property Assessed Clean Energy (PACE) financing program represents an innovative approach to providing capital for energy and water efficient retrofits, among other improvements to building structures. PACE programs allow government entities, such as a city, county, or state, to provide the upfront capital for a building owner to invest in a retrofit. The government raises the money from the municipal or state bond market. The building owner then pays the government back via an increase to the semiannual property tax assessment. The advantage for a homeowner is that the payments stay with the property and not with the owner in the event that the owner sells the property before he or she can pay off the retrofit lien. The California legislature authorized local governments to create these programs in 2008 through AB 811 (Levine).[47] In 2009, AB 474 (Blumenfield) allowed PACE financing for water efficiency improvements permanently fixed to the property.[48]

Water utilities should be aware that PACE programs for residential customers have stalled recently as a result of a federal agency decision that limits federal support for mortgages on homes with PACE assessments.[49] However, the decision does not affect commercial properties or properties without federally backed mortgages.[50] The decision also faces legal and political challenges that may overturn it. As a result, PACE may still represent a viable option for building owners to invest in water efficiency upgrades.

Water providers should consider efficiency efforts ahead of purchasing new water supplies in developing their water management portfolios
As water districts plan to spend money to acquire new sources of water to meet growing demand, they should first consider dedicating a portion of those resources to conserving an equal amount of water. The resources could help finance incentive programs for customers to reduce usage by a targeted amount and to install water-efficient equipment. The water reductions would offset the need for additional supplies, possibly provide a cheaper alternative, and help the state conserve water.

Water providers should utilize water efficiency experts to target high-volume water users

Water providers should assign efficiency experts, either in house or through private consultants when necessary, to work with businesses to audit and reduce their water consumption. For private businesses, these experts offer an opportunity to save money without having to invest the time and expense to implement the efficiency measures. While not all water providers have the staff or resource capacity to engage in this approach, it may represent a viable strategy for many providers.

"You have to get the biggest bang for your buck. At West Basin Municipal Water District, we targeted several large oil refineries, which were each using enough potable water for thousands of residents. The District gave them incentives to purchase recycled water treated at various levels to meet the refineries' process needs. Using recycled water was the most cost-effective way to go."

-- Paul Jones
Irvine Ranch Water District (former General Manager, West Basin Municipal Water District)

Conclusion: The Water and Energy Nexus

Advocates for increasing water use efficiency to save energy face a critical juncture. Recent legislation addressing state water conservation and climate change have created political momentum for tackling these complex issues. Meanwhile, a growing population and an all-but-certain future of water shortages means that state leaders must act immediately to lay the foundation for long-term efficiency and conservation efforts. Saving water has been a perennial goal for drought-prone California, but the benefits to the state's energy infrastructure, air quality, and climate change mitigation and adaptation measures now make this goal even more important for the future viability of the state and its quality of life.

Participant Bios

John Andrew

California Department of Water Resources

John Andrew is Assistant Deputy Director of the California Department of Water Resources (DWR), where he oversees all of DWR's climate change activities. He was the lead author of DWR's climate change water adaptation white paper, Managing an Uncertain Future; Climate Change Adaptation Strategies for California's Water (October 2008), and served as the water sector lead for the California Climate Adaptation Strategy (December 2009). Mr. Andrew also helped develop the water-related measures in the AB 32 Scoping Plan (December 2008) and led the development of DWR's first sustainability policy (April 2009). From 2004-07, Mr. Andrew was DWR's Chief of Special Planning Projects, and from 2000-03, he served as the Drinking Water Quality Program Manager and Southern California Regional Coordinator for the CALFED Bay-Delta Program. Prior to joining DWR, Mr. Andrew spent eight years in research and field assignments with the drinking water program at the California Department of Health Services in Berkeley. From 1991-98, he was a publicly elected director of the Stege Sanitary District in Contra Costa County. Mr. Andrew has over 20 years of experience in water resources and environmental engineering and is a licensed Civil Engineer in the state of California. He holds degrees in civil engineering and public policy from the University of California at Berkeley.

Chris Brown

California Urban Water Conservation Council

Chris Brown is the Executive Director of the California Urban Water Conservation Council, the largest and most significant statewide water conservation organization in the United States. Brown oversees the Council's goal of integrating urban water conservation Best Management Practices into California's water resources management plans; and the establishment of partnerships between urban water agencies, public interest organizations, and private entities to increase efficient water use throughout the state. Brown began working in water conservation in the late 1980s as the Southern Nevada Director of Citizen Alert, a Nevada non-governmental agency. After the drought of 1995-96, Brown was hired to run the San Antonio Water System's Water Conservation Division. From 1999 until the summer of 2007, Brown was Principal of a water conservation and resource management consulting firm. He has also produced nationally recognized studies on professional vehicle wash conservation; the use of BMPs in conservation planning and program development; and the use of gpcd and other metrics for measuring water savings and goals.

Paula Daniels

Los Angeles Board of Public Works

Commissioner Daniels provides leadership in the area of sustainable water policy, including watershed and urban runoff management, groundwater recharge, water re-use, and food policy as it relates to sustainable agriculture. For over 20 years, Ms. Daniels has been actively involved in California environmental policy issues in large part due to her longtime and close involvement with Heal the Bay, an environmental group whose mission is to improve and protect Southern California coastal waters and beaches. Ms. Daniels was also commissioner with the California Coastal Commission, and a gubernatorial appointee on the governing board of the California Bay-Delta Authority (a cooperative effort among more than 20 state and federal agencies that work with local communities to improve the quality and reliability of California's water supply).

Lynne Galal

Pacific Gas & Electric

Lynne Galal is Pacific Gas and Electric Company's (PG&E) Manager for the newly launched Green Communities and Innovator Pilots Programs. These programs are designed to provide resources to local governments to support long-term strategic efforts to reduce greenhouse gas emissions through utility energy efficiency programs. Lynne also managed PG&E's unique water-energy pilot program in collaboration with the California Public Utilities Commission and several Bay Area water agencies. Prior to coming to PG&E, Lynne spent twenty-years with the federal government, first with NASA and then with the U.S. Army Corps of Engineers where she managed staff and water resource programs related to aquatic ecosystem restoration, flood protection, and navigation. Lynne has an MS in Environmental Engineering from Johns Hopkins University and a BS in Aerospace Engineering from the University of Virginia.

Mikhail Haramati

California Public Utilities Commission

Mikhail Haramati is an analyst in the Energy Division of the California Public Utilities Commission (CPUC). She has a BA in Public Policy from Mills College, and oversees the Embedded Energy in Water Pilots and Evaluations for the CPUC. She was also the contract manager for the Residential Retrofit Impact Evaluations of the 2006-2008 California Investor-Owned Utilities' energy efficiency programs, as well as the CPUC's CFL Market Effects Study. She has worked at the CPUC for 4 years, and is a member of the water energy sub-committee of the Climate Action Team (WETCAT).

Richard Harris

East Bay Municipal Utility District

As Manager of Water Conservation, Richard Harris oversees the development and implementation of the District's Water Conservation Master Planning efforts in support of long-term water supply and demand management goals. He has been at EBMUD for more than 20 years, and prior to EBMUD's Water Conservation Division, he managed the District's Water Recycling Program. Mr. Harris has more than 24 years experience in water and energy resource management, civil engineering and environmental systems planning. He serves as a Board member of the California Urban Water Conservation Council and the Alliance for Water Efficiency; and sits on a number of project advisory committees comprised of California urban water agencies. Mr. Harris is a licensed Civil Engineer and he holds a Masters in Civil Engineering from the University of California at Los Angeles and Bachelors degrees in Business Economics and Environmental Studies from the University of California at Santa Barbara.

Russ Horner

Water Management, Inc.

Passionate about saving water and a long time advocate for the environment, Mr. Horner co-founded Water Management, Inc. (WMI) in 1980. As a water practitioner, Mr. Horner provides hands-on technical assistance and advisory services to domestic and international clients in the areas of water conservation, water demand management, water policy, and best management practices. In addition, Mr. Horner has assisted residential, commercial and industrial clients in developing strategies, analyzing and forecasting end use data to determine consumption patterns and forecasts for their specific geographical regions. Mr. Horner often consults with and advises fixture manufacturers regarding new government regulations and technologies. As President of WMI, he has been active in promoting public-private partnerships in water demand management activities for many years.

Paul Jones

Irvine Ranch Water District

Paul Jones II, P.E. is currently the General Manager of Irvine Ranch Water District. Previously, Mr. Jones was the General Manager of Central and West Basin Municipal Water Districts in Carson, California, where he was responsible for the operation of two wholesale water districts governed by separate publicly-elected boards. The districts own and operate one of the largest water recycling projects in the nation. Mr. Jones has worked as a senior engineer in both the private and public sectors.. In these capacities he coordinated and managed a wide range of water resources, water agency program management, and environmental restoration projects. Mr. Jones currently serves as the President of the Board of the Nature Reserve of Orange County, a non-profit corporation established to oversee the Orange County Central and Coastal Natural Community Conservation Planning habitat reserve of over 37,000 acres. Jones is also the President of the Board of the California WateReuse Association, serves on the Newport Bay Watershed Executive Committee, and is a member of the Orange County Transportation Authority to the Measure M Environmental Clean-up Allocation Committee.

Gary Klein

Affiliated Management

Gary Klein is the Managing Director of Affiliated International Management, LLC. Mr. Klein has been intimately involved in energy efficiency and renewable energy since 1973. One fourth of his career was spent in the Kingdom of Lesotho, the rest in the United States. Mr. Klein has a passion for hot water: getting into it, getting out of it and efficiently delivering it to meet customer's needs. Recently completing 19 years with the California Energy Commission, his firm provides consulting on sustainability through their international team of affiliates.

Bill McDonnell

Metropolitan Water District of Southern California

Bill McDonnell is a Senior Resource Specialist, Metropolitan Water District of Southern California (MWD). Mr. McDonnell leads MWD's water conservation efforts in the commercial and industrial sectors and represents MWD in various forums on matters concerning the interrelationships of California's water and energy resources and infrastructure. He also manages a variety of programs, including MWD's Innovative Conservation Program that awards grants to developers of new water savings appliances and measures.

Don Moseley

Wal-Mart

Don A. Moseley, P.E., Director of Sustainable Facilities, is working on Prototype and New Format Developments within the Real Estate Division for Wal-Mart Stores, Inc. Mr. Moseley is currently engaged in and assisting with the leadership of the "Sustainable Buildings Network" at Wal-Mart. This network, among other things, is charged with reducing the energy and water needs of their developments both in the building and on the site. Prior to his current role, Mr. Moseley managed the design of Wal-Mart's Experimental Stores in McKinney, TX, and Aurora, CO, which both opened in 2005. Mr. Moseley also assisted with the design of Wal-Mart's domestic multi-level projects. He has worked for Wal-Mart for the past 21 years, and prior to Wal-Mart worked for the Arkansas Highway and Transportation Department. Mr. Moseley is a graduate of Vanderbilt University and David Lipscomb College, both of Nashville, TN, and is a registered professional civil engineer.

Victor Muñoz
Safeway

Mr. Muñoz is the Corporate Manager of Energy Utilization for Safeway and oversees all energy efficiency and energy conservation projects for all operating divisions of the company. In 2009, he was appointed the added responsibility of Corporate Energy Advisor for Casa Ley, a Safeway affiliate grocery retail chain headquartered in Culiacan, Mexico. He is also Co-chair of Safeway's Green Team; an internally sanctioned grass roots movement within the company that promotes and inspires employees toward improved personal Health, Volunteerism, Education and Conservation. Mr. Muñoz is also Chair of Safeway Energy Committee; reviewing new technologies relative to energy and water efficiency and reviews all proposed equipment purchase options to ensure that energy efficiency and total lifecycle cost are considered. He is a life-long San Francisco Bay Area resident, making his home in the Glenview District of Oakland and enjoys driving his 34 year old Mercedes Benz powered by B100 Biodiesel.

Jonathan Parfrey
Los Angeles Department of Water and Power

Jonathan Parfrey is a Commissioner with the Board of Water and Power and the director of the GREEN LA Institute which provides educational services to the city's environmental community. Mr. Parfrey was also executive director of the Los Angeles office of the Nobel Peace Prize-winning Physicians for Social Responsibility from 1994 to 2007. In 2003, Mr. Parfrey was appointed to Governor Schwarzenegger's Environmental Policy Team, and was previously appointed to Governor Davis' select committee on radioactive waste disposal. In 1992, he received the Paul S. Delp Award for Outstanding Service, Peace and Social Justice. In 2002 he was awarded a Durfee Foundation Fellowship.

Marsha Prillwitz
Water Consultant

Over the past 25 years, Ms. Prillwitz's professional career has focused on the promotion of sustainable water use practices with emphasis on landscape water conservation and drought. She has carried the water conservation message throughout the United States and internationally to Brazil, Argentina, Uruguay, Mexico, Canada, South Africa, Italy, France, Spain, Jordan, Lebanon and Syria. She retired as Chief of the California Department of Water Resources' Office of Water Use Efficiency in 2004, where she served as the Department's Landscape Program Manager and the Water Use Efficiency Grant Program Manager prior to her appointment as Office Chief. As a water consultant, Ms. Prillwitz was the manager of the legislatively mandated California Landscape Task Force project which led to the production of the 2005 report Water Smart Landscapes for California. From 2007 through 2009, she was part of the "Urban Drought Team" that updated the Urban Drought Guidebook and conducted 21 drought workshops throughout California. She is the author of two books titled Growing Vegetables California Style and Growing Dinner. Ms. Prillwitz also was a free-lance garden writer for many years with the Sacramento Bee. She has a degree in Environmental Studies from California State University, Sacramento.

Anthony Ravitz
Google

Greg Reitz

REthink Development

Greg Reitz is a Founder and Principal at REthink Development. Mr. Reitz entered the real estate business as a green consultant for E2. During his stint there he worked for John Picard, a world-renowned sustainable development consultant on developing master planned communities. In 2003, he was named the Green Building Advisor for the City of Santa Monica where he established the city as the recognized leader in the US for green building initiatives. Mr. Reitz is a LEED accredited professional and currently serves on the Board of Directors for the Los Angeles Chapter of the US Green Building Council. Before entering the field of green building, he helped start several businesses in the high tech industry including multi-national Velodea, Inc., and was a Customer Relationship Management / Business Process Re-engineering consultant for Anderson Consulting.

Amy Rider

KEMA

Ms. Rider is a Senior Sustainability Consultant for Sustainable Buildings and Operations at KEMA where she provides commercial and multifamily design assistance, LEED documentation and commissioning services; offers educational courses on a variety of green building topics and aids municipalities in the development of green building ordinances. Her current work focuses on internal training and helping manage KEMA's LEED certification review work for the Green Building Certification Institute, developing policy-related implementation strategies for public agencies and evaluating water and stormwater design approaches for various public and private sector building projects.

Richard Young

Food Service Technology Center

Richard Young is the senior engineer and Director of Education at the Food Service Technology Center (FSTC), an unbiased research facility that focuses specifically on commercial food service applications. The Food Service Technology Center is the primary information resource for the EPA's ENERGY STAR program for commercial food service and has contributed significantly to the US Green Building Council's Leadership in Energy and Environmental Design (LEED) for Retail rating system.

Mr. Young's electrical engineering background led him into alternative energy and the opportunity to design several cogeneration plants. Mr. Young started by developing several of the FSTC's standard test methods and subsequently became involved in green buildings as project manager for The Energy Efficient McDonald's (TEEM) project. He has 15 years of experience creating and presenting seminars on energy efficiency and currently delivers about 75 sessions a year on this subject. He has authored numerous research reports as well as articles in magazines, newsletters and on the web. Mr. Young and his colleagues at the Food Service Technology Center are currently partnering with the National Restaurant Association's Conserve program; finding new ways to promote the sustainability message to a wider food service audience.

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40 Sean B. Hecht, Cara Horowitz, and M. Rhead Enion, *An Environmental Blueprint for California: How Governor Brown can ensure the State's environmental health and economic prosperity*, UCLA School of Law, January 2011, p. 2. Available at: http://cdn.law.ucla.edu/SiteCollectionDocuments/Environmental%20Law/Environmental_Blueprint_for_California.pdf
41 For more information about the Denver Water campaign, please visit: http://www.denverwater.org/Conservation/UseOnlyWhatYouNeed/CampaignOverview/
42 For more information about WaterSense, please visit: http://www.epa.gov/WaterSense/
43 California Public Utilities Commission, Decision Number 07-10-032, October 18, 2007.
44 For more information, please visit http://www.sctainfo.org/efficient_build.htm#pilot_projects
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46 *See* Kasandra Griffin, Greg Leventis and Brian McDonald, *Implementing a Public Goods Charge for Water*, U.C. Berkeley, Goldman School of Public Policy, July 12, 2010, p. 4.
47 Assembly Bill 811, Statutes of 2008, Chapter 159.
48 Assembly Bill 474, Statutes of 2009, Chapter 444.
49 Federal Housing Finance Agency, *FHFA Statement on Certain Energy Retrofit Loan Programs*, July 6, 2010. Available at: http://www.fhfa.gov/webfiles/15884/PACESTMT7610.pdf
50 To read more about the Federal Housing Finance Agency decision, please visit: http://www.fhfa.gov/webfiles/15884/PACESTMT7610.pdf

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