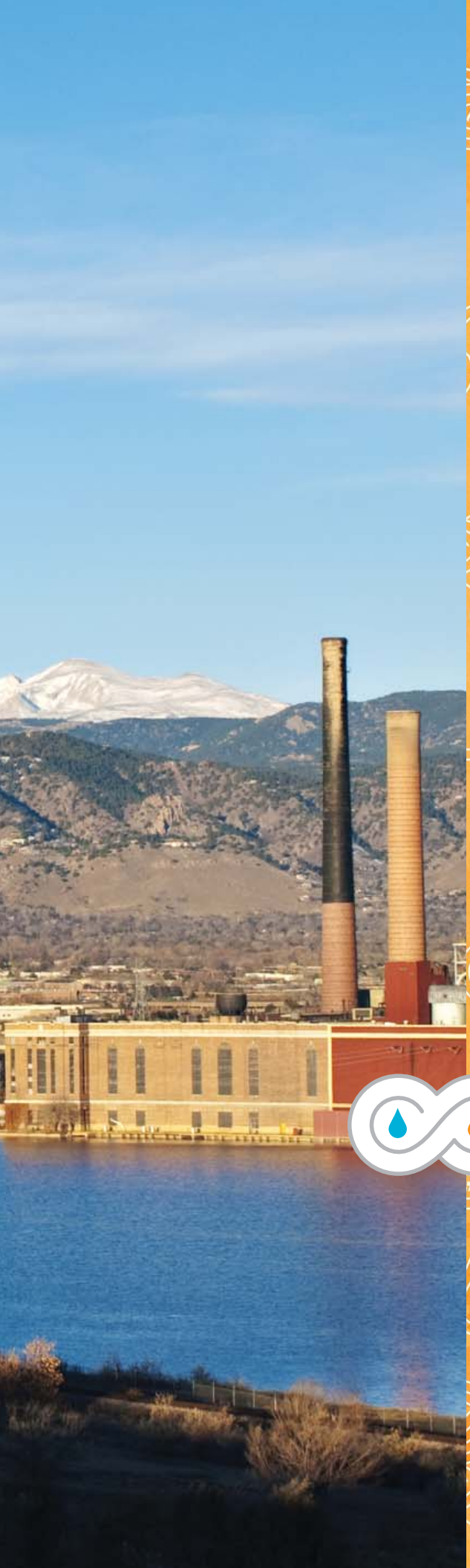

Conservation Synergy

The Case for Integrating Water and Energy Efficiency Programs

WESTERN RESOURCE ADVOCATES

The nexus between water and energy has been understood for several years, yet only a handful of utilities have fully capitalized on this knowledge by combining their efficiency programs.

This report shows that a joint efficiency program is a worthwhile investment, an opportunity to establish a long-term partnership, and presents an excellent business opportunity that should be considered by all utilities.

This report was prepared by Amelia Nuding with invaluable assistance from Bart Miller, Stacy Tellinghuisen, David Berry, Jason Bane, and Anita Schwartz. Design by Carlson Design (jeremycarlson.com); layout by Nicole Theerasatiankul. Edited by Mary Headley of Information Engineering. This report was funded through a grant from an anonymous foundation.

Western Resource Advocates' mission is to protect the West's land, air, and water.

Our lawyers, scientists, and economists:
1) advance clean energy to reduce pollution and global climate change;
2) promote urban water conservation and river restoration; and
3) defend special public lands from energy development.

We collaborate with other conservation groups, hunters and fishermen, ranchers, American Indians, and others to ensure a sustainable future for the West.

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Executive Summary

The nexus between water, electricity, and natural gas has been understood for several years, yet only a handful of utilities have fully capitalized on this knowledge by combining their efficiency programs. There are many interconnections between water, electricity, and natural gas: Significant amounts of water are used for cooling during electricity generation, and significant amounts of electricity and natural gas are used to pump, treat, and heat water for use in homes and businesses. Thus, when one resource is conserved, so is another. Utilities can — and should — leverage this relationship to their advantage by integrating their efficiency programs. This report articulates the reasons for, and the pathways by which, utilities can achieve a conservation synergy.

Water and energy efficiency have long played a critical role in supply planning, and the need for more efficiency continues to grow. Imbalances between water supply and demand are a challenge for many regions across the U.S., particularly in the arid West. Utilities and states are increasingly deploying water and energy efficiency programs as a way to rein in demand. And the federal government has named energy efficiency as a key mitigation strategy against climate change. Despite this need, many utilities face significant challenges with financing and implementing efficiency programs.

Joint efficiency programs have the potential to help meet the growing needs for efficiency at reduced cost. Utilities that have collaborated — a few of which are profiled here — have overwhelmingly found such programs to be a good business decision. The benefits are manifold: higher participation rates, increased customer satisfaction, coordinated and complementary program design, and an improved reputation from working smarter — not harder. The costs are few, stemming primarily from the initial investment of time, and the risks are minimal.

When one resource is conserved, so is another. Utilities can — and should — leverage this relationship to their advantage by integrating their efficiency programs.

The process of collaboration is presented here in four steps, having been distilled from research and interviews with utility staff and efficiency experts across the West:

1. Confer with regulatory bodies and secure commitment from top management.
2. Bring the appropriate staff together to:
    a. Prepare market analysis.
    b. Identify the best, first collaborative opportunities.
    c. Assess cost, benefits, and financing options.
    d. Define roles and responsibilities; address risks.
3. Obtain regulatory approval; implement and evaluate program performance.
4. Explore new opportunities for expanded collaboration.

Examples of collaborative programs include joint communications, rebates, audits, and building efficiency upgrades. Case studies of each type are described. Also highlighted is an informational pamphlet about saving water and energy that can be adopted at no cost by utilities and distributed to customers.

Based on interviews and research, it is clear that collaborators view joint efficiency programs as a worthwhile investment, and they value the opportunity to establish long-term partnerships. An inter-utility partnership — a conservation synergy — presents an excellent business opportunity that should be considered by all utilities.

Introduction

Water, electricity, and natural gas efficiency programs are typically managed separately, but some utilities have had great success forming partnerships to deliver combined efficiency programs. Their collaboration is predicated on the nexus between water and energy; water is used during electricity generation, electricity and natural gas are used during treatment and delivery of water to customers, and natural gas and electricity are used to heat water in homes and businesses. Therefore, when one resource is conserved, so is another. A utility partnership on water and energy conservation has been shown to improve efficiency program participation, increase resource savings, improve customer satisfaction, and potentially lower costs.[1] Such a partnership is the premise of a "conservation synergy."

Synergy:

the interaction or cooperation of two or more organizations to produce a combined effect greater than the sum of their separate effects.

Daybreak/ Photo courtesy of Ed Rosenberg and Kennecott Land

It is estimated that about 13% of the nation's energy use is related to water use. Purple pipes indicate recycled water distribution in the U.S.

Background

The Water–Energy Nexus

The connections between water, electricity, and natural gas have been understood for several years.[2] The energy embedded in water comes from the energy inputs at each stage of water use and treatment. It takes electricity, and sometimes diesel or natural gas, to pump water from its source (either underground or from the surface) and convey it to a treatment facility. From there, energy is used to treat the water to potable standards, distribute it to customers, and heat it for various purposes (such as home use or industrial processes). The final step requires energy to convey the water to a wastewater treatment facility for either reuse or a return to natural waterways. Collectively, these energy inputs are referred to as the "embedded energy in water." It is estimated that about 13% of the nation's energy use is related to water use.[3]

Embedded Energy in Water:

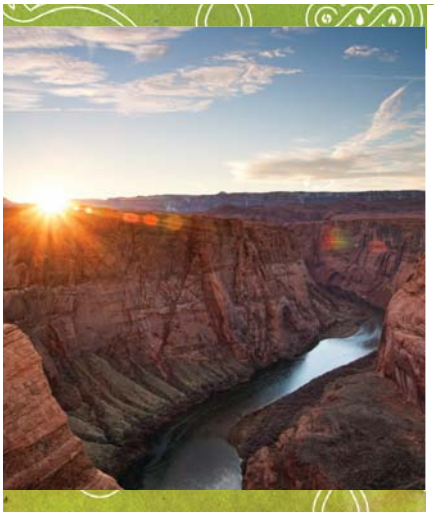
The energy that is used to move, treat, and heat water. It may be expressed as kWh/gallon or therms/gallon.

The other side of the nexus — the water required for electricity and natural gas — is significant, too, particularly during the electricity generation stage. In 2005, thermoelectric power plants withdrew 41% of freshwater withdrawals nation-wide were for thermo-electric power generation.[4] Electricity generated at thermoelectric power plants — which are most often powered by coal, natural gas, or nuclear energy — boil water to spin a turbine, and typically use water to cool and condense the steam for reuse.[5] Water is also used during the fuel procurement stages (mining and drilling) for both coal and natural gas, though this volume of water is significantly smaller.[6]

The importance of the water–energy nexus, for the purposes of this report, lies in the embedded energy in water; that is, when water is saved, energy is saved. The other side of the water–energy nexus — the water used in energy production — is an important topic in its own right, but is generally less relevant to collaborative utility programs. Most water utilities do not provide water to their energy utility's generation facilities, which means there are no water savings to the water utility from energy conservation. A conservation synergy is achieved when multiple utilities can claim resource savings from a single program. In the few cases where water utilities do provide water to generation facilities, it may be valuable to determine the water savings from energy efficiency programs to fully capture the resource savings.

Needs Assessment

Energy and water efficiency programs play a critical role in resource planning for most utilities. In the U.S., 27 states have energy efficiency standards or goals that pertain to regulated electric and gas utilities (in general, investor-owned energy utilities are regulated by a state commission, whereas municipal and rural cooperative associations are not).[7] Beyond regulation, energy efficiency is widely regarded as a less costly alternative to building new power generation facilities — about 3–6 times cheaper according to one study.[8] In addition, the challenges posed by climate change have prompted the federal government to establish policies to reduce carbon emissions, and energy efficiency (particularly in buildings) was named as a key strategy.[9] This strategy will also include loans to rural energy utilities to finance energy efficiency investments.



Demands for water from the Colorado River – the primary water supply for 36 million people in the U.S. and Mexico – routinely outstrip supply. Experts expect this shortfall will worsen as climate change increases demand and decreases supply.

Similarly, water efficiency is widely regarded as a necessary component in water resource planning. Most states have an agency involved in water conservation (though the role they play varies considerably), and some of the more robust water conservation policies are in the West, where supply/demand imbalances are a more pressing issue.[10] In 2012, the U.S. Bureau of Reclamation completed an in-depth study of the Colorado River — the primary water supply for 36 million people in the U.S. and Mexico — and found that demands for water from the river routinely outstrip supply.[11] Experts expect this shortfall will worsen as climate change increases demand and, at the same time, decreases supply. Water conservation has been identified as a key strategy to close this gap.

The need for conservation is clear, but many utilities face challenges in financing and implementing their conservation programs. Water utilities, like some electric and gas utilities, are faced with a significant financial disincentive when they promote conservation. Their revenue is tied to the volume of their sales (of water, electricity, or gas), and so more conservation means less revenue to cover their costs of service. Some other utilities — usually large energy utilities — collect funds for efficiency programs through utility rates, charges on customer bills, or regulatory proceedings associated with decoupling. But these same utilities are often required to meet high efficiency standards set by the state, and some might struggle to obtain sufficient levels of participation in their programs. Similarly, small and medium-sized utilities — both energy and water — often lack the staff and resources to provide customer efficiency services, such as rebate programs or home and business audits.

There is a strategy that can help utilities reduce costs and improve program implementation: a partnership on efficiency programs between water, electric, and gas utilities. Water, electric, and gas utilities tend to offer similar kinds of efficiency programs — such as rebates on devices, audits of homes or commercial spaces, and incentives or assistance with retrofit projects — all of which present a natural opportunity for collaboration. Partnership has the

potential to reduce the costs of implementation by achieving conservation of two or three resources with only one streamlined administrative process. It can also help to increase customer participation by offering larger rebates or incentives, or by co-promoting a single program. Furthermore, partnerships can provide a "one-stop shop" audit or retrofit program that will simplify the process for customers and increase their total savings, thereby improving customer satisfaction.

There are many ways that utilities can collaborate. Collaboration can occur between two or three utilities, or within one integrated utility. Collaboration can also take place between a gas and an electric utility. Electric utilities may be interested not only in reducing demands, but shifting the timing of electric demands. Daily and seasonal peak energy demands can require generation facilities to operate at or near maximum capacity. "Peak-shaving" programs can thus delay or prevent the need for building additional generation capacity and are particularly cost-effective for utilities. These kinds of programs may be an especially attractive option when combined with water efficiency.

Utility Collaboration Examples

Documented water–energy utility collaborations date back to the 1990s in Connecticut, California, Texas, and Washington.[12] A few have occurred more recently, particularly in California, where state agencies actively promote water–energy collaborations. In 2009, the California Public Utilities Commission (CPUC) launched nine pilot programs to quantify the embedded energy savings resulting from water efficiency programs. The CPUC also directed energy utilities to include the water–energy nexus in energy efficiency programs.[13,14] This directive gave rise to the two California case studies summarized below.

The third case study, in Austin, Texas, was profiled in a 2013 report entitled *Tackling the Nexus: Exemplary Programs that Save Both Energy and Water* by the American Council for an Energy-Efficient Economy (ACEEE). This report provides detailed examples of several kinds of water–energy collaborations, as well as lessons learned.

The three case studies presented here illustrate the basic types of inter-utility partnerships. Several benefits have been realized by these utilities already as a result of these partnerships; all of these programs were in progress at the time of this writing, so data on costs and resource savings are limited.

Joint Rebates

In 2008, Pacific Gas and Electric (PG&E), in cooperation with several water agencies California, launched a rebate for high-efficiency clothes washers, and the number of participating agencies has since grown to a total of 41 water agencies (including subagencies, wholesalers, and retailers). PG&E is an investor-owned, regulated gas and electric utility, and the water utilities are a mix of municipal, regional, and private utilities.

The rebate offered to customers in 2013 ranges from $100–125; this includes a $50 rebate from PG&E plus a variable rebate of $50–75 from the water utility.[15] State finances have also contributed to this program.[16] PG&E is the lead administrator of the program; it processes the rebate application, sends data to the participating water agency, and issues checks to customers. PG&E also made significant efforts to work with retailers, educating staff about the rebate process and setting up displays and interactive kiosks to increase awareness and participation.

As a result of this partnership, PG&E has seen a 63% increase in customer participation since the water community joined the effort, and 17 water utilities have seen a 30% increase in their customer participation rates. Overall administration costs are lower due to sharing the processing and marketing costs, and customers have consistently ranked this program as "excellent." It took one to two years to establish this program, and PG&E has indicated that it could lead to more collaborations in the future, such as in the food service technology industry or low-income programs.

Joint Audits

Three utilities — Austin Water Utility, Texas Gas Service, and Austin Energy — collaborated to develop a Multifamily Energy and Water Efficiency Program in 2011.[17] Austin Energy is a municipal electric utility and has previously collaborated with the municipal Austin Water Utility on several other programs. This collaboration is called a "tri-resource" program because it conserves water, electricity, and gas. This program was funded in part by a grant from the U.S. Department of Energy (DOE).

The joint audit program in Austin is anticipated to save 4.7 million kWh of energy – enough energy to supply 400–500 homes for a year, and 10 million gallons of water – enough to supply 60–120 homes for a year.

A joint energy and water audit can result in significant financial savings for utilities because of the relatively high cost of in-person visits.

This program provides efficiency improvements for multifamily residential housing. A facility evaluation is performed by Austin Energy staff, and the results of the evaluation are reviewed jointly by utility staff to identify efficiency upgrade opportunities for freely distributed devices (low-flow faucet aerators and showerheads) and rebated items (dishwashers, clothes washers, and irrigation systems). Additional energy efficiency measures include insulation in attics and around water pipes, and HVAC (heating, ventilation, and air conditioning) tune-ups.

The program started with single-family residences, and, due to its success and high-customer satisfaction, it was expanded to the multifamily sector (e.g., apartments). Once the program is completed, it is anticipated that approximately 1,900 multifamily units will have been upgraded, resulting in 4.7 million kilowatt-hours of energy savings and 10 million gallons of water saved annually. Austin is now considering expanding the program to commercial and institutional facilities, such as hospitals and schools.[18]

One benefit of this tri-resource program is overcoming the split-incentive problem, in which the cost of the upgrade is borne by the owner but the benefits are accrued by the renter. Because this program combines water, gas, and energy efficiency upgrades, the utilities were able to offer a higher value program, incentivizing property owners to participate.[19] Another benefit results from the direct installation of devices, leading to a better guarantee of resource savings. Small appliances like faucet aerators and showerheads would otherwise be distributed, but not necessarily installed.

Joint Building Efficiency Upgrades

In late 2012, the Los Angeles Department of Water and Power (LADWP) and Southern California Gas (SoCalGas) launched the first of six residential and commercial energy–water programs. LADWP is a municipal water and electric utility, and SoCalGas is an investor-owned gas utility.

The collaboration resulted in several programs offered jointly:

- Retrocommissioning Express, which tunes up nonresidential building equipment

- Energy Upgrade California, which helps make improvements in residential and small business energy and water efficiency
- Savings by Design, which provides assistance with new commercial construction design
- California Advanced Homes, which provides assistance with highly efficient new residential design
- Direct Install, which provides efficiency upgrades for small businesses and the Los Angeles Unified School District.

The The LADWP and SoCalGas partnership is seen by the utilities as a "win-win" for utilities and rate payers.

The programs were designed such that one entity takes the lead on a given program where a process or infrastructure is already in place and invoices the other utilities for services rendered. The utilities developed a standardized procedure for sharing information on customer participation, which allows each agency to claim resource savings from each utility's respective programs. The goals of the program were to present a unified program to their shared customers, leveraging costs that would otherwise be borne separately by each utility, and to increase customer participation.

The legal framework of the collaboration was established in just six months. It contains the nondisclosure and confidentiality agreements, and the terms and conditions of the partnership, such as the duration, termination, data reporting, and invoicing procedures. The utilities have also hosted training workshops for one another's staff, to promote knowledge sharing and to facilitate more communication. Though the programs were only recently started at the time of this writing, the partnership is seen by the utilities as a "win-win" for utilities and rate payers.

Utility Collaboration Pathways

The basic process for integrating energy and water efficiency programs is presented below. It has been distilled from research and interviews with utility staff and efficiency professionals. This is a guideline for utilities: It suggests ways to collaborate and the steps to take, and articulates typical differences between water and energy utilities' efficiency programs. Many of these steps are interrelated and may need to happen in a slightly different order. Also, this overview does not address every issue that might arise, since collaborations may have unique attributes.

The four steps in the collaborative process guideline are listed below and detailed in the rest of this section:

1. Confer with regulatory bodies and secure commitment from top management.
2. Bring the appropriate staff together to:
    a. Prepare market analysis.
    b. Identify the best, first collaborative opportunities.
    c. Assess cost, benefits, and financing options.
    d. Define roles and responsibilities; address risks.
3. Obtain regulatory approval; implement and evaluate program performance.
4. Explore new opportunities for expanded collaboration.

1. Confer with regulatory bodies and secure commitment from top management.

It is essential to work early on with the regulatory bodies — usually a public utility commission (PUC), a city council, and/or a utility board. These bodies often have the authority to approve or deny efficiency programs. Regulatory bodies can also be instrumental in enabling inter-utility partnerships —

as is the case in virtually all California water–energy programs — or they may simply be able to approve the program partnership. While approval from a regulatory body may occur at a later stage, such as when a specific program has been fully developed conceptually, it is important to have these conversations early on to support a program's success.

Commitment from top management was also identified by utility staff as critical to a successful collaboration. An inter-utility collaboration may require staff time across multiple departments, including finance and accounting, planning and conservation, and the legal department. Support from upper management can help keep this potentially large number of staff moving forward to establish an agreement in a timely manner. Commitment at the top level may necessitate a clear understanding of the likely benefits and costs of a partnership at the outset. The general costs and benefits are outlined in Table 1 in this report, and may be refined by a more detailed analysis.

Bringing the appropriate staff together includes: Preparing a market analysis of customers, programs, and regulatory processes; identifying the best, first collaborative opportunities; assessing costs, benefits, and financing options; defining roles and responsibilities; and assessing risks.

2. Bring the appropriate staff together and develop programs.

The composition of the necessary people to forge an agreement will vary from utility to utility, but some of the common participants are conservation program managers, finance/accounting staff, outreach/communication managers, and attorneys. Several utility staff commented on the importance of outreach and communications to program success, and some noted that their coordinated marketing strategy helped to increase program participation. Attorneys may be needed in the final stages of drawing up an agreement to ensure customer privacy, formalize new processes, and establish roles and responsibilities. In addition, many utilities rely on third-party entities — consultants, community groups, or others — who may be able to play a significant role in coordinating and combining program activities.

2a. Prepare market analysis.

It may be useful for each utility to have prepared some information in advance of the first meeting, or soon thereafter, to enable an agreement to be reached more quickly.

Customers and Program Review

An inter-utility program can only be offered to customers within the common service territories of all utilities involved. Customer overlap can be determined several ways, and it will likely depend on the databases kept by each utility and their respective abilities to query the data or perform spatial analysis. Once the eligible customers are determined, a better picture of the target market can emerge. This may include demographic metrics, such as percentage of residential vs. commercial customers, multifamily housing vs. single-family homes, socio-economic profiles, building age, and the expected

rate of new construction in the area. A review of past programs may be informative during inter-utility discussions, and a review of current and future programs may offer relatively easy opportunities for near-term partnerships.

Regulatory Processes

The regulatory authority governing a utility may be a public service commission, a city council, and/or a utility board. Understanding the similarities and differences between the regulatory processes will be important when establishing a partnership. An overview of the general processes is provided below.

State utility commissions — Public utility commissions have been established by states to regulate investor-owned electric and natural gas utilities, some cooperative energy utilities, and some privately owned water utilities. Energy efficiency is one aspect of what they regulate, and the standards vary widely across the West and the nation. States may have electricity and/or gas efficiency standards (which are required), goals (which are encouraged), or neither.[20] Furthermore, within a state, the standards or goals may vary by utility, or apply to all utilities. With limited exceptions (such as Arizona's Active Management Areas), water utilities are not required to meet efficiency targets set by a commission or other state agency, but there may be other, noncompulsory state goals.

Usually, energy efficiency programs are first evaluated and selected by the utility, and then submitted to the PUC for approval. In many cases, the program review process is open to the public, and stakeholders such as companies, consultants, consumer group advocates, and environmental groups often engage. A water utility is certainly able to participate as well, but a joint program would require a closer working relationship. The evaluation process by the PUC tends to be rigorous and includes several cost-benefit tests. These tests may evaluate the present and future costs and benefits to the utility, the customers, and society as a whole.

City councils — City councils typically approve municipal utilities' general budgets. Municipal utilities are most often water providers, sometimes electricity providers, and less often gas providers. The degree to which the city council engages in the conservation program budget and plans varies; participation can be instrumental in passing program budgets or virtually nonexistent. Typically, the work done to evaluate candidate programs is done by utility staff, and this may or may not also include stakeholder input. These cost-benefit analyses are not usually as extensive as those required by state commissions.

Utility boards — Energy cooperatives, which are often rural electric utilities, are owned by the members they serve. Usually the customers elect board members to represent their interests. These boards may be responsible for hiring a manager and a chief executive officer to run the organization. The business and financial decisions — including efficiency program decisions — must benefit the customer/owners.

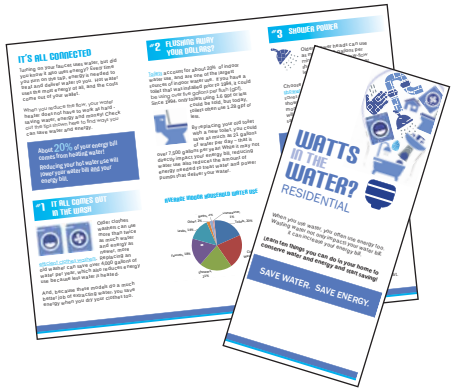
Private water utilities and some municipal water utilities also must have their efficiency programs/plans reviewed by their boards. In addition, some private or municipal utilities may also be required to present or coordinate their efficiency plans with a state agency, such as a public utility commission or a state water board, as in Arizona and Colorado. The reporting requirements tend not to be as stringent as they are for regulated, investor-owned energy utilities.

2b. Identify the best, first collaborative opportunities.

Some utilities may already be offering water–energy saving devices, such as free showerheads or dishwasher rebates. In these cases, a partnership could enhance the existing program by:

- Sharing and expanding program promotion
- Adding a second, low-cost device to the offer (like faucet aerators or showerheads)
- Increasing the rebate amount, thereby increasing customer participation
- Improving the selection of devices rebated, based on input from the other utility (i.e., ensuring that water and energy savings are maximized)
- Increasing customer satisfaction

If no existing program can be readily built upon, programs such as joint communications, rebates, audits, and building efficiency programs are a good first step.



Watts in the Water Brochures: These informational pamphlets explain the connection between water and energy, and are available to utilities at no charge.

Joint Communications

Joint communications and messaging can be an easy way to begin a collaboration process, such as communicating with customers about the benefits of saving energy when they save water. See Appendix A for an informational pamphlet for utilities' customers entitled *Watts in the Water*. These pamphlets are available to any utility at no charge, ready for a website or paper distribution. To make it a collaborative effort, each utility can put its logo on the pamphlet, feature its efficiency programs, and coordinate the distribution to shared customers.

Joint Rebates

A joint rebate presents a natural opportunity for inter-utility collaboration. It is among the easier programs to implement because it uses a format common to many utilities. Rebated items may include residential clothes washing machines and dishwashers, and commercial laundry machines, ice makers, steam cookers, and dishwashers. The collaboration between PG&E and the multiple water agencies, described earlier, was a large undertaking initially because of the number of utilities involved. It took more than a year to reach the agreement, but now provides a framework to establish subsequent programs. An added benefit from a coordinated rebate is that it can prevent unintended consequences, such as promotion of a highly energy-efficient dishwasher that has subpar water savings.

Joint Audits

A joint audit has the potential for significant financial savings because of the relatively high cost of in-person visits. This may be especially appropriate for gas and electricity utilities, since it is a program commonly offered by both. To integrate water, an auditor can simply install efficient faucet aerators and showerheads in a residence or a prerinse spray nozzle in a commercial kitchen, and point to any rebates that may be available. This partnership would also help to solve the problem associated with device give-aways, where the actual installation rate is much lower than the give-away rate. The tri-resource program offered by Austin Energy, Texas Gas Service, and Austin Water Utility is an example of this kind of program.

Joint Building Efficiency Upgrades

A more comprehensive approach to efficiency would address new and existing buildings, like the numerous programs formed by LADWP and SoCalGas. Programs for existing buildings could combine HVAC system tune-ups with an irrigation system tune-up. Assistance with rebates and financing options could also be provided. New building efficiency upgrades might include efficiency design assistance, help accessing rebates, and financing. These programs require more expertise and planning, but the electric, gas, and water savings can be much larger than they would be with a joint rebate.

2c. Assess costs and benefits, and financing options.

Virtually every efficiency program under consideration undergoes an evaluation of the costs and benefits. This analysis can be performed in several ways, but some metrics common to almost every cost-benefit analysis are the quantity of the resource conserved (in gallons, megawatt-hours, therms), and the cost of a device or a rebate. Staff and contractor time spent on promotion, implementation, and administration are also often included.

Water and energy utilities often have different methods for performing cost-benefit analyses, as well as program data collection and management. State-regulated energy and gas utilities usually need to show a detailed and rigorous accounting of a program's projected costs and benefits by performing several cost-benefit tests. The Total Resource Cost Test or Societal Test may include the value of water saved, but this is fairly uncommon.[21] Post hoc assessments — which may include monitoring, research, and evaluation to better determine program participation, free ridership, costs, and savings — are often performed to inform and improve future efficiency investments. This is typical in states where efficiency program cost recovery mechanisms already exist, like in Nevada.

Utilities subject to a board and/or a city council review tend not to develop such detailed analyses. For example, water utilities are typically much less data driven, may have unique data classification systems, and often have little or no external need to provide in-depth assessments of their programs. As a result, there may be many differences in the attitudes held and the activities performed in program evaluation and implementation.

TABLE Nº 1 SUMMARY OF POTENTIAL COSTS AND BENEFITS RESULTING FROM COLLABORATIVE EFFICIENCY PROGRAMS

	Potential Benefits	Potential Costs
UTILITY	· Elimination of duplicative administrative processes, potentially lowering costs	· Time for project planning (e.g., market analysis)
	· Increased outreach to customers and participation levels	· Time for utility staff to reach initial agreement
	· Improved customer satisfaction	· Time to establish new processes for transferring information and money
	· Improved reputation from working smarter, not harder	· Joint marketing and material costs
	· Long-term opportunities for collaboration	
	· Improved demand forecasting with awareness of other utilities' efforts	
	· Coordinated and complementary program design will prevent duplicative or sub-par device selection	
CUTOMERS	· Less effort, more resource savings	
	· Larger rebates	

*This does not include the benefits and costs that would occur if the same program were implemented by one utility only.

In addition to the typically quantified resource savings and financial costs, an inter-utility partnership may result in several other benefits, and a few other costs, as summarized in Table 1. These were derived primarily from interviews and research.

Financial Assistance

All of the partnerships profiled here received financial and/or regulatory assistance. In the case of the Austin Energy collaboration, a grant from the DOE helped make its initiative possible. (Note that these Austin utilities had previously collaborated on rebates and programs without external funding.) Many states and U.S. Environmental Protection Agency regions offer revolving loan funds for water and/or energy projects. The U.S. Bureau of Reclamation offers a variety of Water Smart grants — some of which have included energy efficiency — and in 2013 the U.S. Department of Agriculture Rural Utilities Service proposed an Energy Efficiency and Conservation Loan Service, which would help rural utilities to finance efficiency investments.

2d. Define roles and responsibilities; assess risks.

An inter-utility agreement will have operational impacts on established work flows. Specifically, utilities will have to determine new roles and responsibilities in administration and program management. This may include activities such as marketing and outreach efforts; training of each other's inspectors; inspections procedures; intake and processing procedures; protection of customer privacy; data collection and record keeping; and program evaluation, measurement, and verification. Changes to the established financial accounting process may include a flow of invoices, receipts of payment, limits on incentive/rebates, and staff time allocation. Utility staff from collaborating utilities commonly noted that once these logistics were sorted out, the programs ran very smoothly.

These new processes and responsibilities are often solidified in a legal agreement, such as a contract, memorandum of understanding (MOU), or inter-utility agreement. The collaborating utilities in Austin used an MOU, and the utilities in Los Angeles established an inter-utility agreement. These agreements minimize the risk of collaboration by clarifying the terms and conditions of partnership, as well as options for termination. This is especially helpful during the early stages to help establish trust.

The division of duties may be relatively straightforward to allocate. In the partnership between LADWP and SoCalGas, each utility took the lead on certain programs. They developed a standardized process for sharing information about customer participation and program outcomes (such as actual vs. predicted savings). In one case, the program was pre-existing; therefore, the utility leading the administration remained the same, and expansion was simply a matter of adding in the process for sharing data and financial expenditures. In the case of the PG&E collaboration, PG&E led the administration rather than having multiple water utilities take on that task.

3. Obtain regulatory approval; implement and evaluate program performance.

Communication with regulatory authorities throughout the collaboration process is important to obtaining approval. When such approvals are granted, utilities may begin their joint program(s) pursuant to the terms agreed upon. During and after the completion of the joint program, a joint evaluation of the program's performance will help to improve future iterations and new programs.

Beyond the Basics:

Cold Water-Energy Efficiency Programs

Water leak detection

Leak detection and repair of water utility mains has been conducted by water utilities for decades. Recently, this effort was piloted in California as an energy saving program. The California Public Utilities Commission directed energy utilities in the state to conduct nine pilot studies to determine the actual energy savings from cold water efficiency programs, aimed at saving water and embedded energy.[24] The commission's report on these nine programs showed that the leak detection and repair program resulted in the largest energy savings, while also being one of the most cost-effective programs. The results showed a range of savings from each of three water utilities: 11–38 millions of gallons of water and 65–356 megawatt-hours in annual savings. The savings at any given water utility will depend largely on the water leakage rates and the energy intensity of each utility's system.

Residential irrigation efficiency

A different study was conducted by the California Energy Commission to determine the effect of "time-of-use" water meters and incentives in reducing mid-day irrigation in Palm Desert, California, for residential, commercial, and irrigation customers.[25] Mid-day irrigation is an inefficient use of water due to high evaporation losses, and it also coincides with peak electricity demands. Many energy utilities invest significant resources into "peak-shaving" programs. The water utility serving Palm Desert relies on groundwater, and pumps water at approximately the same time that it is demanded by customers. The study estimated that the water utility saved energy and money by shifting customers' water demand to later in the day. The presumed energy savings were dependent on the fact that the water utility relies on pumping groundwater. This particular program could be applicable to other water utilities that also rely on groundwater, and actual, measured energy savings could confirm the resource savings. This innovative program combines cold water efficiency with a peak-energy shaving program and highlights the potential for energy savings from irrigation efficiency.

Agricultural irrigation efficiency

The largest water–energy program in the West for irrigators is called "Save Water Save Energy."[26] This is a different kind of program from those mentioned previously because it does not include water utilities. In only in a few cases do irrigators receive water from municipal water utilities; more often, they either have their own water rights or receive water from water conservancy districts, ditch companies, or reservoir companies. However, given the large amount of water used by irrigators, this is a program concept that is worthy of consideration by energy utilities.

"Save Water Save Energy" is a collaboration between the Bonneville Power Administration (which operates in several states in the Northwest), public energy utilities, rural electric co-ops, and state resource conservation and development (RC&D) councils, which form a network of nonprofit agricultural conservation groups. The purpose of the program is to streamline energy and water conservation efforts, to create more partnerships between local utilities and RC&D councils, and to provide technical, hands-on assistance to irrigators to increase energy and water efficiency. This program has been implemented in parts of eight states: Washington, Oregon, Idaho, Montana, Wyoming, California, and Utah. Direct energy savings are the focus, and embedded energy savings from irrigation efficiency may result as well.

4. Explore new opportunities for expanded collaboration.

One of the benefits of a partnership on a basic program, such as a rebate or audit, is that it lays the groundwork for utilities to collaborate more easily on future programs or to tackle more challenging ones. For example, Austin Energy and Austin Water Utility had collaborated on a rebate in the past and were thus better prepared for collaborating with Texas Gas Service on the Multifamily Energy and Water Efficiency Program.

One way to go beyond a basic partnership would be to implement a joint cold water–energy efficiency program. This type of program would account for the energy embedded in water due to the water utility's energy inputs, and not the energy used by customers to heat the water. Cold water efficiency programs could include leak detection programs in a water utility's distribution network or outdoor irrigation efficiency programs. The volume of water saved through these programs is likely to be greater than from any indoor water efficiency program. Municipalities — especially those with aging infrastructure — can have leakage rates from water distribution pipelines from 5–30% of total water deliveries.[22] And, in a typical single-family residence, lawn irrigation can account for about 30–60% of water use.[23] The embedded energy savings may be minimal or significant, depending on the water system configuration and volume of water saved.

Energy utilities do not typically account for embedded energy savings for several reasons, including these:

- The concept of embedded energy has only recently become commonly understood.
- Allocation issues can arise if the water utility doesn't rely solely on one energy provider.
- The embedded energy can be difficult to quantify because of monthly, seasonal, or annual fluctuations in energy use.

The State of California has invested significant resources in quantifying embedded energy, studying the potential for its inclusion in energy efficiency programs and addressing the barriers to adoption. A handful of programs have been established to explore and address this issue, as described on the previous page.

Overcoming Barriers

Through research and interviews with utilities, some common challenges in establishing a collaboration were identified. Reaching agreement between utilities can be difficult as well as time-consuming. Many energy utilities have much larger service territories than water utilities and may want to coordinate with multiple parties to develop a single program, which makes the collaborative process inherently more complex. One possible solution is for a third-party entity, perhaps a state or regional group, to represent multiple water utilities. This worked well in the joint rebate offered by PG&E; the Bay Area Water Supply and Conservation Agency represented approximately 26 cities and water districts, which significantly reduced the number of separate agreements.

Differences in data collection and operational practices can also be a challenge. Methods of financial accounting, customer databases, and data on conservation program activities can be very different. The data sharing requirements may require changes in operations and may create uncertainties about the ability of partners to follow through. Conversations that clarify the needs of each partner will help to uncover these differences, and MOUs and inter-utility agreements can help to assuage fears during the early stage of trust-building.

The availability of funds and differences in funding cycles can also be a challenge. Partners' funding cycles may begin at different times of the year, resulting in incompatible windows of opportunity in which money is available for conservation programs. Funding cycles may also occur once every two years, for example, which could delay the development of a new program. This could result in a longer planning period, and potentially a state agency could help to make funds available from a state revolving loan fund. Lastly, the regulatory bodies governing each utility can play a critical role in the success or failure of a joint program. Procedural requirements for one utility, particularly those regulated by PUCs, may be incompatible with another utility's process. Or, a PUC may lack interest in new efficiency measures, making the extra hurdle of collaboration too great. It is necessary to engage early with these entities to uncover these issues and attempt to address them.

Two informative reports on the challenges encountered by collaborating utilities include the aforementioned ACEEE report and the *Process Evaluation of the PG&E, SCE, SDG&E and SCG Water Pilot Programs*,[27] which describes the collaborative processes of the nine embedded energy in water programs piloted in California. However, among the overall observations in the Process Evaluation report was this: "Despite the challenges that many of the programs experienced, there was generally high satisfaction among the participating water agencies, contractors and customers."[28]

Summary and Recommendations

Why didn't we do this earlier?

This is a common sentiment expressed by utilities that have partnered on efficiency programs. Collaborators all noted that once the initial logistics of the partnership were worked out, it was easy to implement the joint program. It takes time and effort to lay the foundation for such a program, but the resulting benefits and the potential for creating a long-term relationship can make the effort worthwhile. It is important to view the partnership as a long-term investment; established partnerships will make subsequent programs easier to implement and may help utilities to tackle the larger, harder programs that may otherwise be impossible for one utility alone.

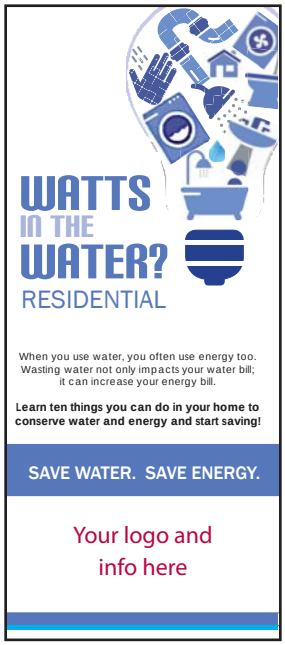
These joint programs are not without their challenges. There are many differences in the operations of water, electricity, and gas utilities, including regulatory structures, terminology, and data management practices. There are also external conditions that may hinder collaboration, such as a utility's lack of interest or ability to implement efficiency programs, or a lack of regulatory support. Joint efficiency programs may not work for all utilities, but there is great untapped potential in this "new" solution to a long-standing challenge.

Conservation synergy has proven to be a good business decision for several utilities. As water and energy efficiency become increasingly important due to water supply and demand imbalances, along with the threats of climate change, utilities of all stripes will have to find new ways to address these challenges. Joint partnerships can make efficiency easier by expanding and improving efficiency programs, streamlining administrative processes, and increasing customer participation and satisfaction. An inter-utility partnership — a conservation synergy — presents an excellent business opportunity that can, and should, be considered by all utilities.

Appendix A.

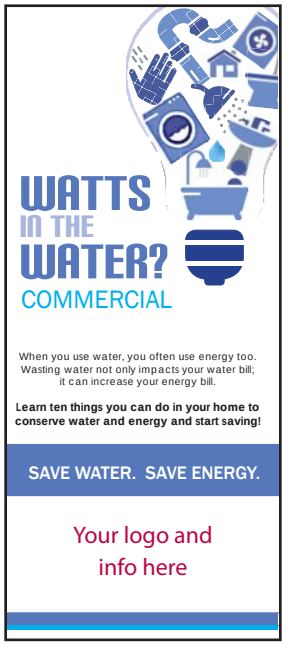
Water-Energy Brochures for Utilities' Customers

These informative brochures educate residential and commercial customers about how saving water can save energy. They are available to utilities at no charge, and can be customized with a utility's logo and information. To download the template, or for more information, please visit: www.westernresourceadvocates.org/conservationsynergy.php



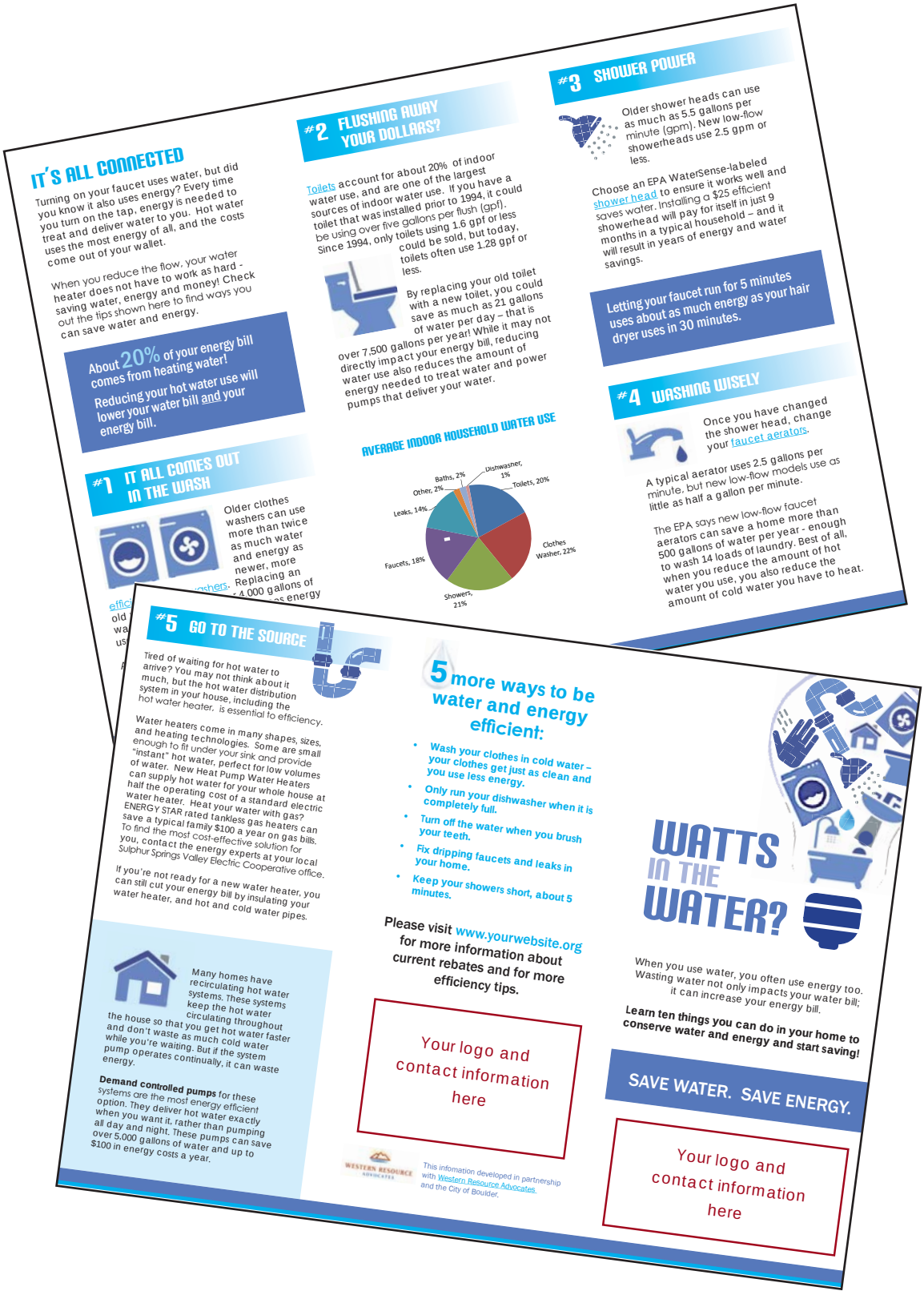
WATTS IN THE WATER: RESIDENTIAL

This pamphlet for residential customers highlights five ways to save energy and water in the home.



WATTS IN THE WATER: COMMERCIAL

This pamphlet for commercial and industrial customers highlights seven ways to save energy while saving water.


IT'S ALL CONNECTED
Turning on your faucet uses water, but did you know it also uses energy? Every time you turn on the tap, energy is needed to treat and deliver water to you. Hot water uses the most energy of all, and the costs come out of your wallet.
When you reduce the flow, your water heater does not have to work as hard - saving water, energy and money! Check out the tips shown here to find ways you can save water and energy.
About 20% of your energy bill comes from heating water!
Reducing your hot water use will lower your water bill and your energy bill.
#1 IT ALL COMES OUT IN THE WASH
Older clothes washers can use more than twice as much water and energy as newer, more
#2 FLUSHING AWAY YOUR DOLLARS?
Toilets account for about 20% of indoor water use, and are one of the largest sources of indoor water use. If you have a toilet that was installed prior to 1994, it could be using over five gallons per flush (gpf). Since 1994, only toilets using 1.6 gpf or less could be sold, but today, toilets often use 1.28 gpf or less.
By replacing your old toilet with a new toilet, you could save as much as 21 gallons of water per day – that is over 7,500 gallons per year! While it may not directly impact your energy bill, reducing water use also reduces the amount of energy needed to treat water and power pumps that deliver your water.
AVERAGE INDOOR HOUSEHOLD WATER USE
Baths, 2%
Dishwasher, 1%
Other, 2%
Toilets, 20%
Leaks, 14%
Faucets, 18%
Clothes Washer, 22%
Showers, 21%
#3 SHOWER POWER
Older shower heads can use as much as 5.5 gallons per minute (gpm). New low-flow showerheads use 2.5 gpm or less.
Choose an EPA WaterSense-labeled shower head to ensure it works well and saves water. Installing a $25 efficient showerhead will pay for itself in just 9 months in a typical household – and it will result in years of energy and water savings.
Letting your faucet run for 5 minutes uses about as much energy as your hair dryer uses in 30 minutes.
#4 WASHING WISELY
Once you have changed the shower head, change your faucet aerators.
A typical aerator uses 2.5 gallons per minute, but new low-flow models use as little as half a gallon per minute.
The EPA says new low-flow faucet aerators can save a home more than 500 gallons of water per year - enough to wash 14 loads of laundry. Best of all, when you reduce the amount of hot water you use, you also reduce the amount of cold water you have to heat.
#5 GO TO THE SOURCE
Tired of waiting for hot water to arrive? You may not think about it much, but the hot water distribution system in your house, including the hot water heater, is essential to efficiency.
Water heaters come in many shapes, sizes, and heating technologies. Some are small enough to fit under your sink and provide "instant" hot water, perfect for low volumes of water. New Heat Pump Water Heaters can supply hot water for your whole house at half the operating cost of a standard electric water heater. Heat your water with gas? ENERGY STAR rated tankless gas heaters can save a typical family $100 a year on gas bills. To find the most cost-effective solution for you, contact the energy experts at your local Sulphur Springs Valley Electric Cooperative office.
If you're not ready for a new water heater, you can still cut your energy bill by insulating your water heater, and hot and cold water pipes.
Many homes have recirculating hot water systems. These systems keep the hot water circulating throughout the house so that you get hot water faster and don't waste as much cold water while you're waiting. But if the system pump operates continually, it can waste energy.
Demand controlled pumps for these systems are the most energy efficient option. They deliver hot water exactly when you want it, rather than pumping all day and night. These pumps can save over 5,000 gallons of water and up to $100 in energy costs a year.
5 more ways to be water and energy efficient:
Wash your clothes in cold water – your clothes get just as clean and you use less energy.
Only run your dishwasher when it is completely full.
Turn off the water when you brush your teeth.
Fix dripping faucets and leaks in your home.
Keep your showers short, about 5 minutes.
Please visit www.yourwebsite.org for more information about current rebates and for more efficiency tips.
Your logo and contact information here
This infomation developed in partnership with Western Resource Advocates and the City of Boulder.
WATTS IN THE WATER?
When you use water, you often use energy too. Wasting water not only impacts your water bill; it can increase your energy bill.
Learn ten things you can do in your home to conserve water and energy and start saving!
SAVE WATER. SAVE ENERGY.
Your logo and contact information here

Endnotes

1. Most of the joint efficiency programs described in this report were in progress at the time of writing, and the additional costs or savings that may have resulted from the partnership were generally unavailable. It is estimated by some utilities that costs will be either lower or unchanged from an independently implemented program.
2. The following two studies have been foundational in quantifying the interconnections between water and energy, although numerous reports by state governments, federal governments, researchers, and consultants have also been written. 1) Klein, Gary, Martha Krebs, Valerie Hall, Terry O'Brien, and B.B. Blevins. 2005. *California's Water–Energy Relationship*. Sacramento, Calif.: California Energy Commission. Report CEC-700-2005-011-SF. 2) Macknick, Jordan, Robin Newmark, Garvin Heath, and KC Hallett. 2011. *A Review of Operational Water Consumption and Withdrawal Factors for Electricity Generating Technologies*. Golden, Colo.: U.S. Department of Energy, National Renewable Energy Laboratories. Technical Report NREL/TP-6A20-50900.
3. Sanders, Kelly T., and Michael E. Weber. 2012. "Evaluating the Energy Consumed for Water Use in the United States." *Environmental Research Letters* 7(3):1–11.
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5. Some power plants, particularly in arid areas, rely on air-cooled condensers to cool and condense steam. These use minimal amounts of water.
6. Meldrum, James, Syndi Nettles-Anderson, Garvin Heath, and Jordan Macknick. 2012. "Life Cycle Water Use for Electricity Generation: A Review and Harmonization of Literature Estimates." *Environmental Research Letters* 8(1):015031.
7. U.S. Department of Energy, Database of State Incentives for Renewables & Efficiency. 2013. "Energy Efficiency Resource Standards." Accessed July 8, 2013. http://www.dsireusa.org/documents/summarymaps/EERS_map.pdf.
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10. Christiansen, William, Mary Ann Dickenson, Adam Schemp, Megan Herzog, Kenneth Mirvis, and Alexa Loftus. 2013. *The Water Efficiency and Conservation State Scorecard: An Assessment of Laws and Policies*. Chicago: Alliance for Water Efficiency, and Washington, DC: Environmental Law Institute.
11. U.S. Department of the Interior, Bureau of Reclamation. 2012. *Colorado River Basin Water Supply and Demand Study*. Page SR-7. Available at http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/index.html.
12. Dyballa, Cynthia, and Christopher Connelly. 1992. "Electric and Water Utilities: Building Cooperation and Savings." Paper presented at the Summer Study on Energy Efficiency in Buildings for the American Council for an Energy-Efficient Economy, Panel 5, Paper 7, August 1.
13. CPUC Decision 12-05-015, Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach, California Public Utilities Commission, May 10, 2012.
14. Park, Laurie, and Kenneth Croyle. 2012. *California's Water–Energy Nexus: Pathways to Implementation*. Woburn, Mass.: GEI Consultants, Inc.
15. Pacific Gas and Electric Company. 2013. "High-Efficiency Clothes Washer Rebate." http://www.waterenergysavings.com/docs/pdfs/clotheswasher_application.pdf.
16. State finances are from the State of California water bond measure, Proposition 84, administered by the California Department of Water Resources.

17. Young, Rachel, and Eric Mackres. 2013. *Tackling the Nexus: Exemplary Programs that Save Both Energy and Water*. Washington, DC: American Council for an Energy-Efficient Economy. Research Report E131.
18. Ibid.
19. Ibid.
20. U.S. Department of Energy, Database of State Incentives for Renewables & Efficiency. 2013. "Energy Efficiency Resource Standards." Accessed July 8, 2013. http://www.dsireusa.org/documents/summarymaps/EERS_map.pdf.
21. Personal communications with Leland Keller, expert energy regulatory analyst, May 31, 2013.
22. Generally, water utility leakage rates are not well known; if they are, they are not publicized. This range is based on some unpublished municipal data and some estimates that are not confirmed. The actual range could be even larger than what is reported here.
23. U.S. Environmental Protection Agency, Office of Wastewater Management, WaterSense. 2013. "Outdoor Water Use in the United States." Last updated August 22, 2013. http://www.epa.gov/WaterSense/pubs/outdoor.html.
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27. ECONorthwest. 2010. *Process Evaluation of the PG&E, SCE, SDG&E and SCG Water Pilot Programs*. Prepared for Southern California Edison. Study ID SCE0294.01.
28. Ibid., viii.

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