Tackling the Nexus: Exemplary Programs that Save Both Energy and Water

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Executive Summary

Energy and water have an inherent relationship. Energy is needed to transport, treat, heat, cool, and recycle water and, conversely, water is needed in energy production. As a result, saving water saves energy and saving energy saves water. This intersection and interaction between energy and water is known as the "energy-water nexus." Some energy efficiency programs have begun to address and account for water savings, and conversely some water programs have begun to account for energy savings impacts, but this has occurred only in a patchwork of programs across the country. Greater efficiency could be gained from recognition of the energy-water nexus in program delivery and accounting practices and better understanding and coordination between the two communities. To recognize possible future directions for program delivery that reaps the benefits of the water-energy nexus, the American Council for an Energy-Efficient Economy (ACEEE) and the Alliance for Water Efficiency (AWE) present here their first-ever awards project for exemplary efficiency programs that save both water and energy.

ACEEE accepted nominations from programs from the U.S., Canada, and Australia whose aim is to save energy and water from numerous sectors including: Agriculture; Commercial; Energy Supply or Generation; Industry; Research, Development, and Deployment; Residential; and Water/Wastewater Treatment and Conveyance. We also solicited nominations for programs that cut across several sectors. An expert panel of energy-water efficiency professionals and ACEEE and AWE staff examined the 54 nominations received. All programs are featured in the ACEEE Water-Energy Program Directory (aceee.org/w-e-programs). The panel decided on five award winners and seven Honorable Mentions. The Honorable Mentions include one "Sustained Achievement" and six "Promising Programs." The Promising Programs were shy of the Exemplary Program Award because they were either new and had only been operating for one or two years, or they hadn't yet achieved a level of market penetration on par with the Exemplary Programs. The winners represent all regions of the United States and a diverse set of models for water-energy efficiency program design, administration, and implementation.

From our review of nominated programs, several program trends and similarities began to emerge. These trends are highlighted below:

- The primary feature of all of the winning programs and many of the programs reviewed in this report is that they were able to achieve cost-effective savings for both energy and water.
- Many recognized programs involve partnerships and collaboration among a diversity of organizations including utilities, nonprofit organizations, industries, governments, and regional groups.
- Many recognized programs are part of a broader initiative focused on integrating resource use as a central consideration in long-term planning and as a part of organizational culture.
- Many of the recognized programs utilize a "one-stop-shop" structure where customers can find all the information on energy efficiency opportunities available to them at one location.

- Several programs started out with a narrower focus and came to find that linking energy and water savings also led to broader program goals and initiatives. Programs that made the link often expanded into institutional sustainability programs.

- Water-energy nexus programs are often seen as long-term investments. Though all of the programs recognized in this report implement cost-effective measures, programs sometimes require upfront investments with payback over time. These investments were seen as worthwhile because of the significant ongoing benefits.

- All of the winning programs incorporated particularly innovative designs and/or implementation techniques that have achieved positive, near-term results and promise significant future impacts.

There were also similar challenges that these programs faced and had to overcome. These challenges are listed below:

- Programs often had to go to greater lengths to secure commitment to the program from the partners. In many cases, ensuring that stakeholders understood the full scope of potential benefits from the program helped increase commitment and investment levels.

- Getting the multiple organizations to understand their roles, communicate effectively, and become willing to trust one another was a significant accomplishment for many of the programs. Many programs established a decision-making process, rules of operations, and draft legal documents to ensure effective collaboration.

- Sustained funding, staff time, and organizational commitments were challenges for many of the programs that were reviewed. Many were able to overcome this challenge through collaboration among multiple organizations or applying for federal grant money.

- Quantifying the embedded energy use in water is one barrier to energy and water efficiency programs that not all programs were able to overcome. In some cases, programs included embedded use in their savings calculations and in other cases they were not able to.

EXEMPLARY PROGRAM AWARD WINNERS

Darden Sustainability—15 X 15

Darden Restaurants
Commercial (Indoor and Outdoor)

Darden is the world's largest full-service restaurant company, headquartered in Orlando, Florida. It operates several restaurant brands. In 2009, Darden Restaurants set a target of a 15% reduction in energy and water use on a per restaurant basis by 2015 compared to a 2008 baseline. By 2011, they had already exceeded their water savings goal by achieving 17% savings and had also achieved an 8% energy savings. Darden's efforts demonstrate that for many companies it is possible to start resource-saving programs and that there is significant savings to be had at little cost. Additionally, these

measures provide the basis for developing a continuous improvement approach to resource management. Darden made an average investment from FY2009–FY2011 of $3.3 million and achieved $6 million savings annually on average from FY2009–FY2011.

Energy Performance Contracting Program

City of Boulder, Colorado
Corporate/Government/Institutional Sustainability

In 2009, the City of Boulder, Colorado, chose to improve the energy and water performance of 66 of 330 city-owned facilities, accounting for 1.5 million square feet of floor space and representing over 90% of total energy use from city operations. The Colorado Governor's Energy Office selected McKinstry Essention as their energy services company (ESCO) to run their energy performance contract (EPC). Boulder's efforts pushed the EPC model beyond standard practice. They approached the process from a comprehensive perspective incorporating all of their public buildings and all systems in the buildings. The energy and water improvements made over four years resulted in over $660,000 in utility cost savings each year. They invested $16.2 million over 4 years with 13–15 year debt financed through the ESCO and Qualified Energy Conservation Bonds (QECBs). Additional funds were applied from Xcel rebates, the Colorado Carbon Fund Grant, the Energy Efficiency and Conservation Block Grant (EECBG), and city capital.

Long-Term Sustainability Program

Massachusetts Water Resources Authority (MWRA)
Corporate/Government/Institutional Sustainability

The Massachusetts Water Resources Authority has pursued both water and energy efficiency initiatives since its establishment in 1984. Originally developed as only a water efficiency effort, MWRA's Long Range Water Supply Program has evolved over time into an overarching "long-term sustainability program." MWRA's efficiency efforts provide a good example of a water utility successfully managing customer costs and providing environmental benefits through prioritizing demand-side management to achieve large water and energy savings, avoid capacity expansions, and decrease operating expenses. The program has resulted in a savings of 140 million gallons per day from water efficiency activities (a 41% reduction over 1980 use). The program has achieved $350 million in avoided customer costs from water efficiency, $24 million in savings annually from energy management, low carbon intensity of the water system, improved environmental quality of rivers and aquifers, reduced supply constraints, and new economic development possibilities. The program had a $440,000 budget for water and energy programs in FY2012.

2015 Sustainability Goals

United Technologies Corporation (UTC)
Corporate/Government/Institutional Sustainability

United Technologies Corporation provides innovative, high technology products and services to the aerospace and building system industries worldwide. UTC has had Environment, Health & Safety (EH&S) performance goals since 1992, including resource conservation goals. In 2006, UTC

successfully closed out their prior goals to improve resource performance and set new sustainability goals for 2007 through 2015 that focus beyond company resource use alone. UTC's goals now include operational resource efficiency goals and greenhouse gas goals as well as product efficiency and supplier sustainability programs. UTC has committed to reducing water consumption by 40% and greenhouse gas emissions by 27% in absolute terms by year-end 2015, compared to a 2006 baseline. Simultaneously UTC committed to identifying opportunities and spending $100 million on energy efficiency projects including combined heat and power (or "co-generation"). UTC's efforts demonstrate the ability of mature energy and water management programs to find significant additional savings opportunities. Between 2006 and June 2012, the program also avoided $55 million in energy costs and $700,000 in water costs.

Leak Detection Pilot Program

Southern California Edison
Water Utilities

The Leak Detection Pilot program of Southern California Edison, an electric utility, provides assistance to water utilities in auditing their water distribution systems for leaks and recommending repairs and other interventions. The goal of the program is for repairs to provide: 1) direct water saving from reduced leakage in the distribution system; and 2) embedded energy savings from reduced electricity requirements for water supply, conveyance, treatment, and distribution resulting from avoided leakage. The pilot is a good example of a water and energy utility partnership to develop a water savings program that also considers the value of saving energy embedded in water systems.

HONORABLE MENTION PROGRAMS

	Program and Administrator	Sector	Exemplary
Promising Program	Green Home Certification Standard, Florida Green Building Coalition (FGBC)	Residential (Indoor and Outdoor)	The program is a statewide green building program that began in 2001. It was selected as "Promising" because its green building checklist is a comprehensive set of criteria that target both water and energy in new construction residential buildings; however, participation is still low. Their marketing is around being "green" generally, but the program's strength is in its specific definitions and its specification to Florida's climate.
Promising Program	Multifamily Energy and Water Efficiency Program, Austin, Texas Area Utilities	Residential (Indoor and Outdoor); Cross-cutting/ Other	The program began in 2011 and is still burgeoning. The program is an example of a one-stop-shop approach program that works to overcome split incentives imbedded in rented building spaces. In addition, the program is a good example of collaboration on programs between multiple utilities and effectively co-designing complementary building policies and efficiency programs.

	Program and Administrator	Sector	Exemplary
Promising Program	Windsor Efficiency PAYS®, Town of Windsor, California	Residential (Indoor and Outdoor)	The pilot program began in August 2012 and is still in the early stages. It was selected as Promising because it is designed as revenue neutral while targeting a large participation level and large planned savings.
Promising Program	Save Water–Save Energy Agricultural Energy Efficiency Program, Bonneville Power Administration	Agriculture	The program started in 2011 and is still in the beginning stages. It was selected as Promising because it is an excellent example of multi-organization partnerships with a comprehensive set of agriculture processes. The program is also recognized for its strong funding commitments, focus on water quality, and dedication to providing their customers with extensive assistance to achieve the most savings.
Promising Program	Ozone Laundry Program, City Of Santa Rosa California	Commercial & Industrial (Indoor and Outdoor)	The program was selected because of its strong market penetration and large savings. The program began in 2009 and is an example of a successful implementation of an emerging technology (the ozone laundry technology) that saves both water and energy.
Promising Program	Watts To Water , Denver Metro Building Owners and Managers Association (BOMA)	Commercial & Industrial (Indoor and Outdoor)	The program began in 2011 and was able to harness a significant amount of funding targeted at a historically difficult market with large potential savings. In addition, the program is an example of strong partnerships.
Sustained Achievement	LivingWise, Resource Action Programs (RAP)	Residential (Indoor and Outdoor)	The program has been ongoing since 1994 and has run programs in 32 states. The program is recognized as Sustained Achievement for its longevity, market penetration, and presence across the country.

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Background

The American Council for an Energy-Efficient Economy (ACEEE) and the Alliance for Water Efficiency (AWE), with input from the energy efficiency and water efficiency communities, began working in collaboration in 2010 to bring attention to the opportunities to jointly reduce the use of water and energy. This report, which focuses on Exemplary Programs saving both energy and water, is one in a series of research and policy activities that were identified by experts in both the water and energy efficiency fields as priorities to help achieve greater understanding, coordination, and partnership between the two communities. The priorities resulting from this stakeholder engagement process were summarized in *Addressing the Energy-Water Nexus: A Blueprint for Action and Policy Agenda* (ACEEE & AWE 2011).

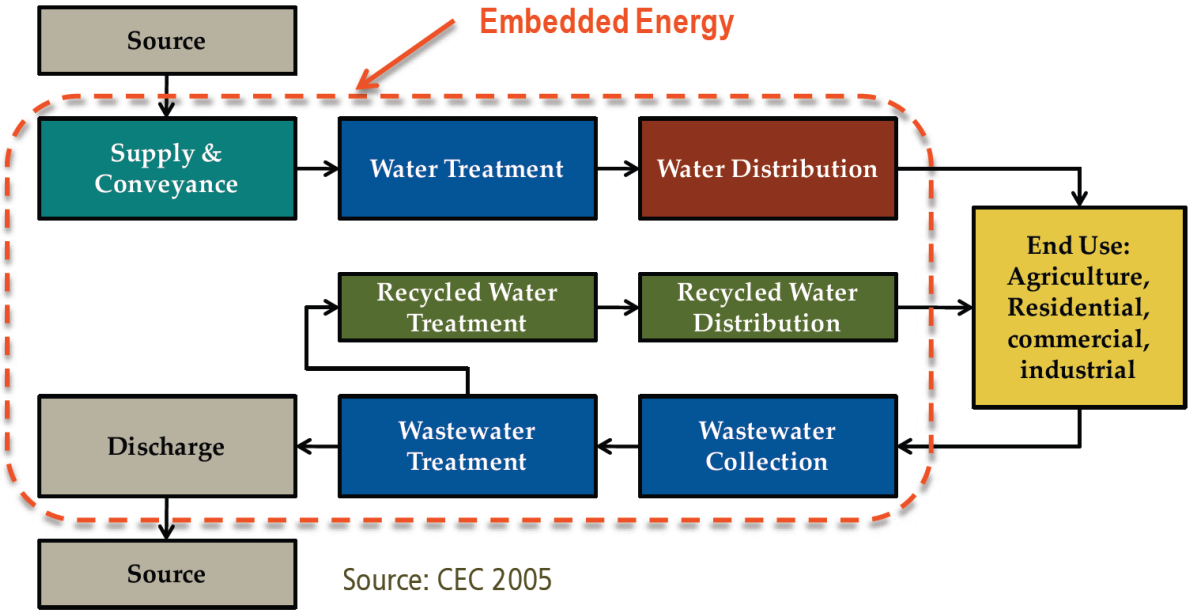
ACEEE's best practice program reports include the following: (1) *Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs Across the U.S.; (2) America's Best: Profiles of America's Leading Energy Efficiency Programs*, which examined programs funded through utility rates; and (3) *States Stepping Forward: Best Practices for State-Led Energy Efficiency Programs* (York and Kushler 2003; York, Kushler and Witte 2008; Sciortino 2010). Similar to these reports, this project has three main objectives: (1) to identify Exemplary Programs that work to save both energy and water and provide details on their design, implementation, and performance so that others can improve their own programs; (2) to publicly recognize with awards the programs that are exemplary and innovative in reducing energy and water use, cost-effectively and in a replicable manner; and (3) to improve peer learning among existing programs saving both water and energy through the creation of a directory with a comprehensive listing of water-energy programs. The intention of this research is to provide a valuable resource for energy and water utility program developers, energy managers, and evaluators, as well as other organizations working to reduce water and energy consumption.

Energy-Water Nexus

The overlap between energy and water has come to be known as the "energy-water nexus"—the intersection and interaction between energy and water.

First, water resources rely on energy. Energy is needed to transport, treat, heat, cool, and recycle water. The energy intensity of a volume of water is heavily influenced by factors such as water quality, proximity to a treatment facility, intended end-use, and the wastewater treatment facilities (Sanders 2012). One state with strong data that can help inform the magnitude of energy embedded in water use is California. In 2005, the California Energy Commission (CEC) found that sourcing, moving, treating, heating, collecting, re-treating, and disposing of water consumed 19% of the state's electricity, 30% of its natural gas, and 88 billion gallons of diesel fuel each year, and those amounts grow each year (CEC 2005). Figure 1 is taken from the CEC study and it shows the points in the water use cycle where there is embedded energy. Energy embedded in water is the sum of energy input into water along these various points of the water use cycle.

Figure 1. Water Use Cycle



Conversely, energy resources rely on water. Water is needed for the extraction, mining, refining, and processing of oil, gas, and coal, as well as for electric generation. The force of water turns turbines that generate hydroelectric electricity. Most thermal power plants use water for cooling, and nuclear power plants are the most intensive users of water. A U.S. Geological Survey report estimated that 49% of the nation's total water use and 53% of fresh surface-water withdrawals went into the production of thermoelectric power (USGS 2009).The thermoelectric power sector has been the largest water withdrawer in the U.S. since 1965.

Based on these two relationships, it is clear that saving water saves energy and saving energy saves water. Saving water at the end-use (customer) level and throughout the distribution system can save energy because it reduces the energy needed for water withdrawal, transportation, treatment, etc. Saving electricity at the end-use (customer) level can save water because it reduces the need for electricity generation and therefore that water required in the generation process. In addition, saving other forms of energy (e.g., natural gas) also saves water needed for resource extraction, production, processing, etc.

Energy-Water Program History and Challenges

Over the last 35 years, there have been increasing efforts to reduce end-use energy consumption and improve energy efficiency while over the last 20 years there have been similar organized efforts to conserve water. Though historically the two communities have not collaborated to the fullest extent possible, the natural relationship between saving water and energy has spurred a number of successful programs that aim to save both resources. Energy and water utilities have worked together because there are many efficiency measures that save both energy and water (e.g., efficient clothes washers and better cooling towers). Utilities can also undertake numerous other activities to promote demand-side

reductions at the residential and commercial level, such as offering education and outreach programs, combined energy and water audits, energy and water efficiency kits, and rebate and installation programs. The successful programs highlighted in this report are models for future energy and water efficiency programs.

As more programs begin to focus on the energy-water nexus, there is an increasing demand for information about how to address challenges through best practices. This report aims to highlight some exemplary program practices while also giving best practice examples of how new programs can avoid pitfalls and achieve substantial cost-effective energy and water savings.

Some of the common challenges identified by the programs included limited funding, lack of knowledge of the relationship between water and energy, challenges coordinating between utilities and between utilities and governments, and difficulty identifying metrics and quantifying savings. Quantifying the embedded energy use in water is one barrier to energy and water efficiency programs. This report aims to highlight how some Exemplary Programs have begun to address these challenges, such as comprehensively assessing the benefits and savings from their programs (including embedded savings).

Methodology

The methodology of the project was similar to ACEEE's previous best practice programs reports. We assembled a small panel of energy and water efficiency experts—which included experts from ACEEE and AWE staff—that both served as advisors and judged the nominations, ultimately identifying best practice programs and Honorable Mentions including Promising and Sustained program awardees. In addition to the authors, the panel included: Mary Ann Dickinson (AWE); Cindy Dyballa (Independent Consultant); Robert Lung (Alliance to Save Energy); James E. McMahon (Better Climate Research and Policy Analysis); Susan Stratton (Northwest Energy Efficiency Alliance); and Lorraine White (GEI Consultants).

ACEEE and AWE staff and the expert panelists, with input from an ongoing working group on water-energy programs, developed criteria for recognition and a program nomination form (see Appendix 4 for the nomination form). A call for nominations was posted on the ACEEE website and distributed by e-mail to several thousand contacts from the ACEEE and AWE networks, encompassing both the water and energy efficiency communities. Simultaneously with the nomination process, we also encouraged all program managers of water-energy programs to submit basic information about their program, even if they did not consider it exemplary, for inclusion in the ACEEE Water-Energy Program Directory. Our expert panel and the working group helped us solicit nominations and provided examples for the kinds of programs we should deem as exemplary.

After the end of the two-month nomination period, ACEEE staff compiled the nominations and presented them to the panel of expert judges. The group first discussed the nominations at a high level, including topics such as gaps in the nominations, whether any nominations were ineligible, and whether any of the programs should be considered in a different category than the one in which they were nominated. The panel established a common scoring system and began scoring to find the

Exemplary Programs. Throughout the process, the experts analyzed the programs, adding insight to familiar programs, and requested clarification or comment on unfamiliar programs.

As the programs were being selected, it became clear that some programs were deserving of acknowledgment in other categories in addition to Exemplary Programs. The panel proposed recognizing strong but untested programs that were too new to have yet shown significant savings as "Promising," and programs that demonstrated continued success but are missing one of the other criteria as "Sustained Achievement." In addition, the panel worked to ensure that the programs selected for recognition represented sector and regional diversity.

Through a consensus process, the panel then decided which programs and how many would receive the various awards. Once the programs were selected, ACEEE staff corresponded with the program managers to collect additional information and develop detailed case studies on each of the programs to be honored. The draft report was reviewed by the panelists and the working group members, and program managers were given the opportunity to review the case studies of their respective programs. Full program write-ups for all of the programs selected for recognition in each category can be found in Appendices 1 through 3. Every program nominated for an award can be found in the ACEEE Water-Energy Program Directory along with many other programs submitted or compiled from other sources.

PROGRAM ELIGIBILITY

Nominated programs were elicited from the following sectors:

- Residential
- Commercial
- Industry
- Water/Wastewater Treatment and Conveyance
- Energy Supply or Generation
- Agriculture
- Research, Development, and Deployment
- Sector Crosscutting

ACEEE Water-Energy Program Directory

ACEEE has created a publically available online resource that provides basic information on over 450 existing programs that save both water and energy across the United States, Canada, and Australia. The program information was received from the program nominations, submissions directly to the directory, and from the E Source DSMdat database. The directory also includes contact information for point people administrating each program when available.

http://aceee.org/w-e-programs

Does your organization have a water-energy program you'd like to share? In order to keep the directory up to date, we encourage anyone involved in the management of a program that saves both water and energy to submit their program for inclusion in the directory.

Program submission link:

http://aceee.org/node/add/we-program

Programs were only considered if they fulfilled the following eligibility criteria:

- Program targets end-users of energy or water.
- Program includes documented and verified savings of energy and water (however, the goals of the program need not include both energy and water savings).
- Approach is transferrable to other locations.

PROGRAM SECTORS

Not all programs that save both energy and water are run by utilities. There are many examples of programs that are run by nonprofit organizations, private companies, local and state governments, and community organizations, often in partnership with utilities. Programs that are run by multiple kinds of organizations allow them to cover all sectors of the economy.

Since water-energy savings programs are beneficial in all sectors, for this report we selected programs from the following: Residential; Commercial and Industrial; Corporate, Government, and Institutional Sustainability (repurposed from solicited program list); Agriculture; Water/Wastewater Treatment and Conveyance; and programs that cut across sectors. These categories represent different amounts of water and energy consumption in the United States, and the opportunities for efficiency measures and programs vary. The aim of this report is to provide best practice examples of programs that cover many of these categories to give a good representation of what can be achieved in each sector. Below is greater detail on the water and energy use and savings opportunities for each of the categories.

RESIDENTIAL Residential water and energy efficiency measures include both indoor water use (e.g., toilets, showers and baths, clothes washers, dishwaters, etc.) and outdoor water use (e.g., irrigation, pools, and spas). Water and energy savings measures and programs include audits, kits, rebates, low-flow fixtures, metering and monitoring, leak management, and more. Leaks are encountered both inside and outside residences, and may include leaking pipes and faulty valves (e.g., a leaking faucet or toilet). Residential programs have historically been focused on direct install measures (e.g., programs that focus on installing compact fluorescent light bulbs, low-flow showerheads and faucet aerators, water heater wraps, water pipe insulation, etc.). This report focuses on programs that achieve greater savings over a longer period of time and are constantly growing. These programs may focus on market transformation to lock-in ongoing savings, comprehensive whole-home approaches, or underserved markets such as multifamily housing and overcoming incentive barriers. Programs in the residential sector in this report include LivingWise, the Green Home Certification Program, and Windsor Efficiency PAYS® (Appendices 2 and 3).

COMMERCIAL AND INDUSTRIAL Commercial, institutional, and most of industrial water use accounts for nearly one-third of the public water supply sector nationally (ICF 2008). Overall, commercial water use varies widely and includes use in office buildings, hotels and motels, warehouses, private schools and universities, laundries, retail stores, and many others commercial activities. In addition to the indoor and outdoor water uses that are similar to residential indoor and outdoor uses (toilets, landscaping, etc.), the commercial sector has many process-specific issues such as process rinses, photographic processing, car washing, laundry, process cooling, etc. For example, one program highlighted in this report that focuses on commercial laundry is the City of Santa Rosa Ozone Laundry Program (Appendix 2).

Commercial and industrial end-use water-energy programs are diverse because there is no single technology or practice that can improve efficiency among all of the eligible customers. Since the commercial and industrial sectors often have process-specific uses that consume a significant amount of water, it is beneficial to have programs that conduct water inventories and audits to pinpoint opportunities to improve water management, including audits, surveys, water spending evaluations, and identifying opportunities for savings. Once opportunities are identified then custom water-energy savings technologies can be implemented. Programs in this sector highlighted in this report include Darden Restaurants' 15x15 efforts, City of Boulder's performance contract for public buildings, United Technologies Corporation's Sustainability 2015 investments, Watts To Water , and Save Water–Save Energy Agricultural Energy Efficiency Program (Appendices 1 and 2).

WATER/WASTEWATER TREATMENT AND CONVEYANCE Water and wastewater treatment and conveyance accounts for about 3 to 4% of annual energy consumption in the United States (EPA 2012). The energy intensity of wastewater treatment is divided into two categories: electricity used for pumping and electricity used for aeration. Water supply and wastewater treatment are often provided by municipal government and the energy required for these services is often the largest energy expenditure for a local government.

The energy use in water supply and wastewater treatment facilities can be addressed in two ways: 1) water efficiency measures can reduce the demand for water supply and wastewater treatment, thereby reducing the energy requirements at facilities; and 2) energy efficiency measures or less energy-intensive processes can be implemented at these facilities. The Massachusetts Water Resources Authority (MWRA), one of our Exemplary Program honorees, is an example of a water utility that has had success with both of these interventions (see Appendix 1).

As discussed earlier, large amounts of water are needed for energy production. Water withdrawal for power plant cooling is the largest single use of water in the U.S., estimated at 195,000 million gallons per day (mgd) (USGS 2009). Power plants use water for once-through cooling systems, recirculating cooling systems, steam, emission controls (e.g., NOx control systems), auxiliary equipment, cooling, and plant maintenance and personnel needs (ICF 2008). Plants that use recirculating, as opposed to once-though, cooling systems can significantly decrease water withdrawal needs; however, they can increase water consumption if not effectively managed (Macknick, Newmark, and Hallett 2011). Water use embedded in energy production can also be reduced though more efficient electricity transmission or by reducing end-use energy consumption, both of which lessen the amount of energy needed to be produced and in turn reduce the need for water in those processes. We did not award recognition to a program focused specifically on thermoelectric generation; however, MWRA's efficiency efforts do include efficient on-site methane capture and electricity generation that requires no additional water (Appendix 1).

AGRICULTURE Irrigation, primarily for agriculture, accounts for 31% of total water withdrawals in the United States (USGS 2009). Agriculture accounts for 70% of total water withdrawals globally. In agricultural production, water is used extensively for irrigation to sustain plant growth. Irrigation also includes water that is applied for pre-irrigation, frost protection, application of chemicals, weed control, field preparation, crop cooling, harvesting, dust suppression, and leaching salts from the root

zone, and water lost in conveyance. In irrigation, energy use is both embedded and direct (i.e., direct: pumping water through the irrigation systems; embedded: pumping water that has previously been pumped from a water district reservoir). Programs that aim to improve efficiency in the agriculture sector integrate sustained savings measures for irrigation systems as well as other farm energy and water systems. One of the programs discussed later in this report, the Save Water–Save Energy Agricultural Energy Efficiency Program, is focused on a variety of efficiency measures in the agriculture sector (Appendix 2).

CROSSCUTTING Crosscutting programs cover multiple sectors of the economy and are meant to achieve savings throughout the economy. These programs often focus more broadly, such as on a whole system, allowing them to penetrate across multiple sectors. These programs often require extensive coordination (more so than programs in single sectors) between multiple kinds of organizations, utilities, governments, nonprofit organizations, and business. One example from the programs recognized is the Multifamily Energy and Water Efficiency Program, administered the City of Austin, which aims to save water and energy and their associated costs for low-income residents, older facilities, multifamily residential owners, and renters. The program is a good example of collaboration on programs among multiple utilities and effectively co-designing complementary building policies and efficiency programs (Appendix 2).

CRITERIA FOR RECOGNITION

Programs that received recognition demonstrated the qualitative attributes listed below. Whether a program had "significant" participation or savings was determined by the expert panel.

ENERGY AND WATER SAVINGS AND OTHER BENEFITS The program had to deliver significant immediate and long-term energy savings (kWh, therm, and/or fuel) and power (KW) savings as well as significant immediate and long-term water savings (gallons) from efficiency. Program benefits could be primarily related to either water or energy savings, but must provide some savings of both. Other benefits, such as reduced greenhouse gas emissions, were also considered.

MARKET IMPACTS The program had to demonstrate the ability to produce desirable and lasting improvements in the efficiency characteristics and performance of the targeted market. The program had to show that it was contributing to a long-term shift in the efficiency of the targeted market either by showing an achieved substantial market penetration (e.g., widespread adoption of a new technology) or a significant number of participants relative to the targeted market (i.e., a high percentage of potential customers participated in the program).

COST-EFFECTIVENESS Programs selected as Exemplary and Sustained Achievement had to demonstrate the ability to yield significant energy and water savings and related benefits relative to the financial costs of the program. For Promising Programs, we relaxed this criterion in recognition that future cost reductions are likely as programs mature.

CUSTOMER SERVICE AND SATISFACTION It was important that the programs provided high quality services to customers participating in programs and satisfied the expectations of customers. The program's

success in this area was evaluated based on what the programs reported, which they gathered through a variety of methods including customer surveys, program feedback, etc.

INNOVATION The program demonstrated that it incorporated particularly innovative designs and/or implementation techniques that have achieved positive, near-term results and promised significant future impacts.

TRANSFERABILITY Programs must have demonstrated program design characteristics that were amenable to replication in other similar settings.

It was also advantageous, but not required, for nominated programs to have used best practice ex post evaluation/verification methodologies to document savings impacts, market effects, and other results achieved by the program (e.g., after measures are installed, their impacts can be evaluated).

Results and Discussion

After the selection process, ACEEE staff conducted a review of the Exemplary and Honorable Mention (Promising and Sustained Achievement) Programs. An outcome of the review was the in-depth summaries of each program (Appendices 1 through 3). In addition, there were a variety of broader trends and challenges that applied to all, or most, of the programs selected. The trends include and add to the criteria already established in the selection process. This section of the report discusses the nominations received, programs selected as Exemplary and Honorable Mention, trends that emerged from the review of the programs, and some recommendations for future research.

NOMINATIONS

ACEEE received 54 program nominations. We received nominations for each program category; however, the expert panel decided to consolidate the categories and rearrange some of the programs based on the distribution of submissions. The original self-categorized list was the following:

- Residential—19
- Commercial—7
- Industry—2
- Water/Wastewater Treatment and Conveyance—12
- Energy Supply or Generation—1
- Agriculture—1
- Research, Development, and Deployment—1
- Sector Crosscutting—6
- Institutional Sustainability—5

The number of programs per sector/category was reorganized by the expert panel as follows:

- Residential—19
- Commercial and Industrial—8
- Corporate, Government, and Institutional Sustainability—8
- Agriculture—1

- Water/Wastewater Treatment and Conveyance—13
- Crosscutting—5

The expert panel and ACEEE staff agreed that the quality of the nominations were generally impressive and we received enough nominations to deem programs as Exemplary. Geographically, the nominations were spread out across the United States, with four nominations from Canada and one from Australia. Though we received nominations from across the United States, many of the nominations were from California or other states on the West Coast. There were a total of 12 out of 54 nominations from California, by far the largest amount of nominations from a single state (22% of total nominations). California is known as a leader in addressing the water-energy nexus and many nominations were expected to come from there. We received 11 nominations from the Southwest (20%), which included Arizona, Colorado, New Mexico, and Texas. From the Northwest, we received a total of 7 nominations (13%), which included Oregon, Washington, Nevada, and Idaho. Combined with California, the Western states totaled 56% of the nominations. These Western states have had some water scarcity issues and many of the programs they nominated were created in response to those scarcities. As a result, the West is generally seen as a leader in energy and water efficiency program development and deployment.

However, there are several excellent programs across the rest of the continental United States where water scarcity is becoming an ever increasing issue. There were 8 programs nominated from the Midwestern states, including Illinois, Minnesota, Michigan, and Ohio. There was also 1 nominated program that spanned across Minnesota, Arkansas, and Oklahoma. Six programs nominated were from the Northeast (Maine, Massachusetts, Pennsylvania, and Rhode Island) and 3 were from Georgia, Florida, and Virginia.

A large number of nominated programs were in the Residential sector. This makes sense as residential programs are common for both energy and water efficiency. One residential program was selected for Sustained Achievement, three were selected as Promising, and no residential programs were selected as Exemplary. The Exemplary award was reserved for programs that were leaders in the field and that were demonstrating sustained program achievements. Many of the nominated residential programs used well-established methods and approaches such as direct installation. Direct install projects, though important, did not meet the criteria of being innovative programs contributing to market transformation. While effective, direct install also doesn't deliver long-term savings through an approach that becomes embedded in institutions.

PROGRAM SELECTION: EXEMPLARY, PROMISING, & SUSTAINED ACHIEVEMENT

The expert panel, ACEEE and AWE staff selected a total of 12 of the nominated programs for recognition: 5 Exemplary programs; 6 Promising programs; and 1 Sustained Achievement program. The number of selected programs per sector/category is as follows:

- Residential - 4
- Commercial and Industrial - 3
- Corporate, Government, and Institutional Sustainability - 3
- Agriculture - 1
- Water/Wastewater Treatment and Conveyance - 1
- Crosscutting

Table 1 below summarizes the efficiency programs chosen as Exemplary.

Table 1. Exemplary Water– Energy Efficiency Programs

Program Name and Administrator	Sector	Description
Darden Sustainability—15 X 15, Darden Restaurants	Commercial & Industrial (Indoor and Outdoor)	Darden is the world's largest full-service restaurant company, headquartered in Orlando, Florida. It operates several restaurant brands. In 2009, Darden Restaurants set a target of a 15% reduction in energy and water use on a per restaurant basis by 2015 compared to a 2008 baseline. By 2011, they had already exceeded their water savings goal by achieving 17% savings and had also achieved an 8% energy savings. Darden's efforts demonstrate that for many companies it is easy to start resource saving programs and that there is significant savings to be had at little cost. Additionally, these easy measures provide the basis for developing a continuous improvement approach to resource management. Darden made an average investment from FY2009–FY2011 of $3.3 million and achieved $6 million savings annually on average during that period. The program saves approximately 567,000 gallons of water and 138 MWh of electricity per restaurant in FY2011 compared to FY2008—17% and 7.9% decreases, respectively. They save approximately 1.13 billion gallons of water and 276 GWh of electricity for all restaurants.

Energy Performance Contracting Program, City of Boulder Colorado	Corporate/ Government/ Institutional Sustainability	In 2009, the City of Boulder, Colorado chose to improve the energy and water performance of 66 of 330 city-owned facilities accounting for 1.5 million square feet, representing over 90% of total energy use from city operations. After ending their partnership with the Energy Performance Contract (EPC) program, the Colorado Governor's Energy Office selected McKinstry Essention as their energy service company (ESCO). Boulder's program is a good example of pushing the boundaries of EPCs to achieve energy and water savings.
Long-Term Sustainability Program, Massachusetts Water Resources Authority	Corporate/ Government/ Institutional Sustainability	The Massachusetts Water Resources Authority (MWRA) has pursued both water and energy efficiency initiatives since its establishment in 1984. Originally developed as only a water efficiency effort, MWRA's Long Range Water Supply Program has evolved over time into an overarching "long-term sustainability program." MWRA's efficiency efforts provide a good example of a water utility successfully managing customer costs and providing environmental benefits through prioritizing demand-side management to achieve large water and energy savings, avoid capacity expansions, and decrease operating expenses. They have saved 46,108,600 kWh, 1,200 kW electric capacity, and 6,983,130 therms natural gas due to energy efficiency investments.
2015 Sustainability Goals, United Technologies Corporation	Corporate/ Government/ Institutional Sustainability	UTC has had Environment, Health &Safety (EH&S) performance goals since 1992, including resource conservation goals. In 2006, UTC successfully closed out its prior goals to improve resource performance and set new sustainability goals for 2007 through 2015. Over time the EH&S conservation goals developed into sustainability goals that have a focus broader than company resource use alone. UTC's goals now include operational resource efficiency goals and greenhouse gas goals as well as product efficiency and supplier sustainability programs. UTC has committed to reducing water consumption by 40% and greenhouse gas emissions by 27% in absolute terms by year-end 2015, compared to a 2006 baseline. Simultaneously UTC committed to identifying opportunities and spending $100 million on energy efficiency projects including combined heat and power (or "co-generation").

Leak Detection Pilot Program, Southern California Edison	Water Utilities	The Leak Detection pilot program of Southern California Edison was designed to provide assistance to water utilities in auditing their water distribution systems for leaks and recommending repairs and other interventions. The goal of the program is for repairs to contribute direct water saving from reduced leakage as well as embedded energy savings from reduced electricity requirements for water supply, conveyance, treatment, and distribution resulting from avoided leakage. The pilot is a good example of a water and energy utility partnership to develop a water savings program that also considers the value of saving energy embedded in water systems. The program saved 497,788 kWh of electricity and 82,923,912 gallons of potable water annually as well as 81 metric tons of carbon dioxide emissions avoided annually. The program also attained $146,000 in annual water agency avoided costs. The program spent $300,000 over 18 months from electric ratepayer funds allocated by the California Public Utilities Commission.

Note: For the full description of each program, see Appendix 1.

Table 2 summarizes the efficiency programs chosen for Honorable Mention as a Promising Program. The Promising Program was given to programs that the expert panel wished to recognize for their achievements, and innovative and transferable models. However, most of the programs were either new and had only been operating for a few years, or they needed greater market penetration to be recognized as "Exemplary." They are programs that show great promise to be Exemplary programs in the future and had characteristics deserving of an Honorable Mention.

Table 2. Promising Water – Energy Efficiency Programs

Program Name Administrator	Sector	Description
Green Home Certification Standard, Florida Green Building Coalition (FGBC)	Residential (Indoor and Outdoor)	The Florida Green Building Coalition created a statewide green building program in 2001, which provides clear and measurable criteria and marketing principles, to help protect Florida's natural environment. The FGBC Green Home Certification Standard is a voluntary program that educates and guides the construction industry through a process of sustainability measures that promote energy efficiency; water conservation; improved health for building occupants; and safer, more durable structures. The mission of the program is to improve Florida's "built environment" and help all Floridians who are seeking to become more responsible stewards of the environment. It was selected as "Promising" because of the low participation but the green building checklist is a well-developed and comprehensive set of renovations that target both water and energy in new construction residential buildings.
Multifamily Energy and Water Efficiency Program, Austin, Texas area utilities	Residential (Indoor and Outdoor); Crosscutting/Other	The Multifamily Energy and Water Efficiency Program in Austin, started in late 2011, provides multifamily facility owners holistic water and energy efficiency evaluations, rebates, and other incentives to save water and energy and their associated costs to end-users. The collaboration among Austin Water Utility (AWU), Austin Energy (AE) and Texas Gas Service (TGS), the three main utilities serving Austin, started as a result of a competitively awarded federal stimulus grant from DOE. The grant encouraged "deep dive" energy upgrades to existing buildings, including multifamily residential properties. The goal of the program is to save water and energy and their associated costs for low-income residents, older facilities, multifamily residential owners, and renters. The program is a good example of collaboration on programs among multiple utilities and effectively co-designing complementary building policies and efficiency programs.

Windsor Efficiency PAYS®, Town of Windsor California	Residential (Indoor and Outdoor)	The Windsor Efficiency PAYS® pilot program began in August 2012 and is still in the early stages. The program is based on the Energy Efficiency Institute, Inc.'s Pay As You Save® (PAYS®) system. The PAYS model requires the financing structure to be repaid completely through energy savings from installed measures. It enables Windsor residents to make efficiency upgrades to their homes or apartment and to replace turf with drought resistant landscaping with no upfront cost and with the immediate net benefit of lower utility bills. The pilot was designed to reach 25% of Windsor's residential customers in one year (2,000 participants) by eliminating all major market barriers that inhibit customers from installing resource efficiency measures that can provide them with immediate positive cash flow. It was selected as Promising because it is designed as revenue neutral with a large participation level and large planned savings.
Ozone Laundry Program, City Of Santa Rosa California	Commercial & Industrial (Indoor and Outdoor)	The City of Santa Rosa Ozone Laundry program is a rebate program for hotels and commercial laundry facilities, started in 2009. The City offers rebates of $200 for every 1,000 gallons of sustainable reduction in water use and wastewater flow that is achieved through the implementation of the ozone laundry technology. The objective of the program is to reduce water and energy use in the hotels and other commercial laundry facilities in the City of Santa Rosa utilizing the ozone laundry technology. The City of Santa Rosa Ozone Laundry program evaluates the achievable water and energy savings that can be gained from retrofitting commercial laundry systems with an ozone laundry system attachment. The program was selected because of its strong market penetration and large savings. It is an example of a successful implementation of an emerging technology that saves both water and energy.
Watts To Water, Denver Metro Building Owners and Managers Association (BOMA)	Commercial & Industrial (Indoor and Outdoor)	Watts To Water is a metro-wide, competitive, one-stop-shop program based in Denver, Colorado since 2011 that is dedicated to reducing energy and water consumption. The goal of the Watts To Water program is to create a more sustainable built environment in the Denver metropolitan area. By using ENERGY STAR Portfolio Manager as a benchmarking tool, the Watts To Water partners help properties reduce energy and water consumption rates by offering program participants free educational sessions, technical support, and rebate programs. Watts To Water teaches office and hotel property managers how to be more environmentally and economically sustainable.

Save Water–Save Energy Agricultural Energy Efficiency Program, Bonneville Power Administration	Agriculture	The Bonneville Power Administration (BPA) and the three state-level Resource Conservation and Development (RC&D) Councils, together with participating Northwest public utilities, established the Save Water–Save Energy Agricultural Energy Efficiency program in 2011. The program works to assist the utilities in offering an extensive and effective irrigation and agriculture water and energy efficiency programs. The Save Water–Save Energy collaborative approach develops and enhances partner support and helps keep the overall program costs low. The goal of the program is to increase the adoption of cost-effective energy and water saving measures in the agricultural sector by providing the necessary "boots on the ground" to assist agriculture producers with project development to qualify for financial incentives. The results of the collaboration have included electric energy savings as well as non-energy benefits such as increased irrigation uniformity and crop yields, reduction in overall cost, and decreased water and fertilizer application.

Note: For the full description of each program, see Appendix 2.

The Sustained Achievement Award was given to a program that has had continuing success and improvement in water and energy efficiency for well over 10 years. Only one program, LivingWise, was awarded this because of its 20-year track record for ongoing savings in many states and localities across the United States. The program is well-deserving of an Honorable Mention for its longevity and continued savings as well as transferability. Table 3 below provides a summary of the LivingWise Program chosen for the Sustained Achievement Award.

Table 3. Sustained Water – Energy Efficiency Programs

Program Name and Administrator	Sector	Description
LivingWise, Resource Action Programs (RAP)	Residential (Indoor and Outdoor)	The LivingWise program from Resource Action Programs (RAP) is a nearly 20-year-old residential energy and water efficiency education program that partners electric and water utilities together to generate immediate savings in home energy and water use. The LivingWise program is a school-based format that includes take-home LivingWise Kits of efficiency measures along with classroom and in-home education. The goal of the program is to create awareness for families to adopt new resource usage habits to reduce energy and water consumption in a cost-effective manner. The program is recognized as a Sustained Achievement program for its longevity, large market penetration, and presence across the country.

Note: For the full program description, see Appendix 3.

EMERGING TRENDS OF LEADING PROGRAMS

Although the programs recognized in this report represent a large diversity of sectors, strategies, scales, and experience, there are a few characteristics that are shared among most of these leading programs. These commonalities and challenges were pulled out after the programs were reviewed. These trends are highlighted below:

- A primary feature of many programs reviewed in the report is that they were able to achieve cost-effective crosscutting program savings for both energy and water. Many programs began more focused on either energy or water and found that they were able to attain and measure both savings simultaneously.

- Programs often had to go to greater lengths to secure commitment to the program from the partners. In many cases, ensuring that stakeholders understood the full scope of potential benefits from the program helped increase commitment and investment levels. This is clearest in programs with collaboration between water and energy utilities, but is present in others as well.

- One key feature of many of the recognized programs is their "one-stop-shop" structure. Several programs were selected and recognized for providing participants with multiple services, information on all the efficiency opportunities offered by their state and utilities, and opportunities to approach efficiency comprehensively rather than measure by measure. Consolidating the available opportunities and information makes installing efficiency measures and projects substantially easier and makes it less likely that participants will miss efficiency opportunities. The one-stop-shop programs have shown proven success and customer satisfaction.

- Several programs started out with a narrower focus and came to find that linking energy and water savings also led to broader program goals and initiatives. Programs that made the link often expanded towards institutional sustainability programs. These sustainability programs aim to cost-effectively achieve water and energy efficiency plus several other non-energy and water goals.

- Water-energy nexus programs are often seen as long-term investments. Though all of the programs recognized in this report implement cost-effective measures, and many are run by utilities, programs sometimes require upfront investments with payback over time. These investments are worthwhile because of the significant ongoing benefits.

- Many of the recognized programs are part of a broader initiative focused on integrating resource use as a central consideration in long-term planning and as a part of organizational culture. The programs are not satisfied with implementing stand-alone projects—they are determined to maintain their investments to derive full value and to discover new opportunities. These organizations developed methods to continuously and systemically evaluate new efficiency opportunities and to prioritize investments in cost-effective demand-side management because of the demonstrated benefits they provided to their operations and to their customers.

The challenges are highlighted below:

- Quantifying the embedded energy use in water is one barrier to energy and water efficiency programs that not all programs were able to overcome. In some cases, programs included embedded use in their savings calculations and in other cases they were not able to.

- Getting the multiple organizations to understand their roles, communicate effectively, and become willing to trust one another was a significant accomplishment for many of the programs. The water and energy sectors and specific organizations have different languages, motivations, and rules for operation. Many programs chose to establish decision-making processes and rules of operations, and draft legal documents to ensure effective collaboration.

- Sustained funding, staff time, and organizational commitments were barriers and challenges for many of the programs that were recognized and awarded. Many were able to overcome this challenge through collaboration among multiple organizations, each providing funding, staff time, or both. Some programs were able to apply for federal grant money to help with the initial phases of their projects but obtaining sustained funding while also trying to expand the program is an ongoing challenge.

Recommendations for Future Research

This program report and the discussions with the expert panel have helped ascertain several areas where additional research for the energy and water efficiency communities is needed. The energy efficiency community has a legacy of more than three decades of identifying, documenting, and replicating successful program models where water efficiency program experience is still growing. This effort has helped us identify the elements contributing to success of these programs and lessons learned so they can be applied to other programs. Below are some possible next-step research opportunities and topics that need additional exploration.

Additional research is needed to examine ways to improve on some of the key successes in multi-organizational collaboration. Specifically, ACEEE and AWE hope to do further research on the opportunities and barriers to joint energy utility and water utility programs. Collaborations among utilities (water, electricity, and natural gas) come with a unique set of challenges and barriers but the additional savings possible from more program resources and the increased convenience for the customers are potentially huge benefits. Clearly identifying successful ways to plan and operate joint programs among utilities would not only provide much needed information but would also encourage more joint utility programs.

Relatedly, there is a need for additional documentation and best practice guidance on integrating water and energy issues and collaboration between water and energy utilities into utility integrated resource planning (IRP) processes. An IRP is a comprehensive and systematic blueprint developed by a supplier, distributor, or end-user of energy or water who has evaluated demand-side and supply-side resource options and economic parameters and determined which options will best help them meet their goals at the lowest reasonable energy, environmental, and societal cost. Including strategies for water savings in energy utility plans and vice versa, along with shared plans between the two entities for collaboration in implementation, has the potential to amplify savings successes. For example, calculating embedded energy savings from water efficiency would assist energy utilities in

achieving their energy goals and better clarify the relationship between water and energy use. Research into what these plans would look like and how they would be created would be extremely helpful for the energy and water planning communities.

It would be valuable for further research to delve deeper into the Research, Development, and Deployment and Energy Supply or Generation categories to explore best practice programs that have focused on new technology research, development, and deployment and energy supply or generation. Within these categories, this research should to look into programs that are working to deploy new technology and increase market penetration and transformation.

Conclusions

Our review of water-energy nexus programs shows that there are important efforts to improve water and energy efficiency. These efforts and the interest in the water-energy nexus have spurred some successful and innovative programs, which represent models for the future. We identified Exemplary programs across a spectrum of sectors including several in the private sector, commercial buildings, and industrial facilities as well as many in collaboration with utilities and government. The Exemplary programs are effective programs, demonstrating that greater efficiency can be gained from recognition of the energy-water nexus and better understanding and coordination between the two communities.

Due to a variety of economic, regulatory, and environmental influences, water and energy efficiency programs are being utilized to improve efficiency. Some states have had ongoing water scarcity and/or energy reliability issues, which have spurred these joint programs. It is logical that regulatory bodies seeking to improve water and energy efficiency would address these resources simultaneously because water and energy are mutually dependent resources; large amounts of water are required in thermal electricity generation and large amounts of energy are required in the treatment and transport of water.

From our review of these programs, we found that there is a patchwork of programs across the U.S. that have successfully reduced and documented energy and water consumption in a long-term, innovative way. This is a promising start that needs to be nurtured and expanded in a wide-scale effort. These successful programs can inform the development of similar water-energy efficiency programs and encourage the design and implementation of additional innovative and comprehensive programs that utilize utility, government, and corporate collaboration.

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Appendix 1: Exemplary Program Awards

DARDEN SUSTAINABILITY—15 X 15

Darden Restaurants

Program at a Glance	
Location: All 50 United States & Canada	*Financial Savings and Other Program Results:* $6 million savings annually on average from FY2009–FY2011. Improved recruitment and retention of employees and reputational benefits.
Sector/Customer Segment: Commercial—restaurants	*Budget and Funding Sources:* Average investment from FY2009–FY2011 of $3.3 million
Program Start (and End) Date: June 2008	*Contact Person*: Brandon Tidwell, Manager of Sustainability btidwell@darden.com (407) 245-5274
Annual Energy and Water Savings: 567,000 gallons and 138 MWh per restaurant in FY2011 compared to FY2008, 17% and 7.9% decreases, respectively. Approximately 1.13 billion gallons & 276 GWh for all restaurants.	*Program Website*: http://www.darden.com/sustainability/

Program Description

Restaurants are large users of both energy and water. Buildings used for food service have the highest energy intensity of all major commercial building types, averaging 258,000 Btus per square foot annually, well above the average of 90,000 Btus and higher even than inpatient health care buildings, which are also notoriously energy intensive (CBECS 2008). Water use intensity in restaurants is also above average. Heavy cooking, refrigeration, and washing, including water heating, are the largest energy and water uses. As a result of high consumption, this sector is a prime candidate for improved energy and water efficiency interventions.

In 2009, Darden Restaurants set a target of a 15% reduction in energy and water use on a per restaurant basis by 2015 compared to a 2008 baseline. By 2011 they had already exceeded their water savings goal by achieving 17% savings and had also achieved an 8% energy savings. Darden's efforts demonstrate that for many companies, it is easy to start resource saving programs and that there is significant savings to be had at little cost. Additionally, these easy measures provide the basis for developing a continuous improvement approach to resource management.

Darden is the world's largest full-service restaurant company, headquartered in Orlando, Florida. It operates several restaurant brands including Red Lobster, Olive Garden, LongHorn Steakhouse, Bahama Breeze, Seasons 52, The Capital Grille, Eddie V's, and Yard House. As of the end of May 2012, the company had around 180,000 employees and operated a total of 1,993 restaurant locations in the U.S. and Canada, generating more than $8 billion in sales annually and serving approximately 400 million meals.

The sustainability efforts at Darden emerged in part because of interest in action from employees. More than 70% of Darden employees are under 30, many of who are particularly attuned to environmental issues. During 2008 and 2009 restaurant tours, operations staff heard a large number of employees asking what Darden was doing to become an "environmentally friendly" company. This notable increase in interest led operations leadership to explore how sustainability could become a part of Darden's corporate culture. Leadership views a focus on sustainability as an important asset for recruitment and retention of employees. Sustainability is also increasingly seen as an opportunity to mitigate other risks as well. Having a sustainability strategy in place provides reputational and public relations "license to operate" benefits in many locations. Additional risks considered include increased operation costs related to new energy or climate change regulation and increased incorporation resource efficiency standards in land use development requirements of some state and local governments, especially in communities concerned about energy or water constraints. Finally, concerns about the impact of droughts or other changes in weather patterns have increased, as the company has already seen prices for key ingredients, such as beef, rise under drought conditions.

The 15x15 goals are a part of a broader corporate sustainability effort that is organized into three areas: "people" (strong culture, economic impact, strategic partnerships, and community investments), "planet" (green buildings, energy efficiency, water conservation, and waste reduction), and "plate" (nutritional commitments, seafood stewardship, supply chain, and food safety and quality). The 15x15 goals are themselves the near-term embodiment of the long-term objective of "15x15 Over Zero," which adds the additional goal of eventually sending zero waste to landfills.

Progress is reported publicly every two years in a Sustainability Report. The most recent was completed after the end of fiscal year 2012 (ending May 2012) using the 2011 Sustainability Reporting Guidelines of the Global Reporting Initiative. Water, energy, and greenhouse gas emissions data for the report was compiled by a third-party auditing firm but was not subject to external assurance. The two-year reporting cycle is intended to be maintained going forward and when possible, regular interim updates will also be published on the company's sustainability webpages.

Management and governance of Darden's 15x15 initiative and broader sustainability efforts occurs at many levels. First, sustainability issues have now been formally elevated to matters that are discussed at the level of the full Board of Directors, whereas before they were handled by the Public Responsibility Committee. Company-wide executive leadership on water and energy are the responsibility of the Director of Sustainability and the Senior VP of Government and Community Affairs, who report to the Board of Directors. The Director of Sustainability interacts with the Board and senior management for input and to provide updates on a regular basis. Within Government and Community Affairs, three teams are responsible for implementation of the sustainability strategy:

Energy, Water and Waste; Supply Chain; and Sustainability Culture. The Energy, Water and Waste team is responsible for the 15x15 commitments and the team consists of representatives from the departments responsible for equipment purchasing, building development, operations, and finance. Some members of the executive team and the Energy, Water and Waste team have energy reduction targets integrated into their performance reviews and consideration of their personal compensation. Many water and energy efficiency requirements are integrated into the company's restaurant operating standards. Efforts are also being made to formally integrate resource efficiency and sustainability more broadly into company-wide governance and accountability mechanisms.

Senior management is represented in the governance process by the Sustainability Leadership Council (SLC), which consists of representatives from many brands and business units, including operations, supply chain, government affairs, human resources, and business development. It is their responsibility to advise on organizational direction and strategy as well as to encourage the implementation of sustainability initiatives in their divisions and ensure accountability. This SLC is also responsible for developing budgets and strategies for each operating unit of Darden in consultation with executive leadership. Implementation of strategies is primarily led by operations and facilities directors and their staff in the individual operating companies and in the field. At the restaurant level, day-to-day implementation support comes primarily from Green Teams. In addition to implementing company-wide programs to reduce energy and water consumption, these restaurant-based teams also identify new ways to improve resource efficiency. These teams meet at least once a quarter to learn about new initiatives and methods to encourage behavioral changes from their fellow employees. Around 12,000 employees are active in championing sustainability in their restaurants.

Considerations for projects are made each fiscal year during the business planning process and capital allocations for water and energy project are determined on an annual basis. Darden sustainability initiatives are not funded through a set-aside budget allocation; rather, the development, facilities, and operations staff must run comprehensive financials and demonstrate a payback period that aligns to the company's hurdle rate. Factors considered include merit, payback, and ability to reduce costs as well as energy and water use. The return on investment criteria used is the same hurdle rate used to evaluate other capital expenditures within the company. Resource-saving projects must achieve a significant return on investment within two to three years.

Staff members from Darden's finance, development, facilities, and equipment purchasing teams developed a model starting in 2009 to evaluate the return on energy and water savings. This information is updated monthly based on utility tracking and provides a snapshot of whether these projects are meeting their savings targets. Using data on projected initial costs, savings, resources impacted, rollout timeline, and other relevant information, the finance team runs analysis for each project and provides the results to the Sustainable Buildings Working Group to determine if the project should be tested, piloted, or rolled out throughout the company or a few select brands.

Specific energy-saving interventions and investments made by Darden include:

- Remodeling of existing restaurants will include completing the conversion to compact fluorescents in kitchen areas in restaurants (savings 3,000 kWh per year per restaurant) and

beginning conversion of all "front of house" lighting to light-emitting diode (LED) bulbs, estimated to save 40,000 kWh per year. As of May 2012, the new systems had already been installed in a quarter of restaurants. External LED lighting is also being tested.

- Equipment for new buildings, remodels, or in the replacement cycle is selected to be the highest efficiency available for kitchen appliances and heating, ventilation and air conditioning equipment. Currently kitchen equipment activities include identifying an alternative steamer machine that delivers the quality and safety demanded and finalizing a new sauté machine that optimizes energy use.
- Improvements in thermostat settings and "power-up" schedules of cooking equipment.
- A Leadership in Energy and Environmental Design (LEED) prototype has been developed for all new restaurants and remodels requiring them to use the most energy and water efficient equipment in Darden's portfolio. As of May 2012, 12 restaurants had received or were pursuing LEED Silver certification. The company plans to continue to build 80 to 100 new restaurants per year by 2016 using these standards (resulting in approximately 16% energy savings compared to a non-LEED building), making a significant impact on company-wide resource performance.
- The new LEED Gold corporate headquarters uses 31% less energy per square foot than their old headquarters. Also 40 million gallons of water were saved at the headquarters since September 2009 through the use of non-potable water in toilets and irrigation.
- Energy use is also considered in Darden's food distribution and supply chain. The energy footprint of the Darden supply chain is greater than its direct use. Most of the distribution network including trucks and distribution centers are not owned or leased by Darden, however because much of the network is used exclusively by them they are able to have considerable influence over capital investments and maintenance decisions. The company's supply chain initiative, Darden Direct, is implementing efficient truck routing, increasing rail shipments, and improving efficiency in distribution centers. The program began saving nearly 38 million miles of driving annually starting in 2012.

Water efficiency interventions undertaken in the last few years include:

- Installing low-flow pre-rinse sprayers and hand washing sink aerators in all restaurants (savings around 400,000 gallons of water per year per restaurant) and removing dipper wells at most Olive Garden restaurants, an intervention now being extended to Red Lobster and LongHorn Steakhouse locations.
- Improving pasta cookers at Olive Garden restaurants to have higher energy efficiency and use low water flow.
- Reducing water use in shrimp thawing process.
- Low flow washers also being tested in Olive Garden locations.
- All new restaurants are designed with region-specific landscaping that uses drip irrigation and native, drought-resistant plants.

New water efficiency measures will continue to be implemented going forward. New technologies being considered include lower-flow pre-rinse sprayers, and more efficient dishwashers, ice makers and restroom faucets. New processes will also be put in place, including eliminating the need for hot

water in the ice removal stage of cleaning ice bins which will save 4 million gallons of water a year in addition to energy. Similarly, location-based Green Teams are implementing a 30-point water leak inspection process at all restaurants. Olive Garden locations will be implementing a Cleaning Chemical Usage Improvement initiative that focuses on employee education about the proper usage of cleaning chemicals, one benefit of which decreased rewashing needs and resulted in water savings benefits.

To date, all Darden restaurants have participated in a variety of programs that do not require capital investments. For water conservation, this includes the enzymatic floor cleaning method, changes in food preparation, low-flow water valves and sprayers, and water leak audits. For energy efficiency, this includes power-up and power-down schedules and thermostat management.

Initial enthusiasm for the sustainability programs at Darden was strong. This was partially due to the cost savings and the impact the initiatives had on the managers' profit and loss statements. In order to engage managers, each restaurant is required to designate a manager to lead the sustainability efforts. This includes posting updated information, facilitating quarterly sustainability meetings, and reporting data through the quarterly audit. Moving forward, managers will continue to be critical change agents and Darden is exploring a host of options to better engage managers. Second, Darden is testing restaurant-level energy management systems in 10 restaurants that sub-meter the most energy demanding systems (e.g., HVAC, walk-in refrigeration, and cooking equipment). This will enable facility managers and corporate staff to remotely monitor performance, identify inefficient systems, and more proactively address changes to reduce demand on water and energy. Finally, the company is exploring a sustainability awards program that will recognize the top performers in each of the restaurant brands.

While most water and energy efficiency efforts are not directly seen by customers, Darden is able to pass along some resulting cost savings to customers. Additionally, although energy and water efforts are not directly advertised to customers, sustainability more broadly is slowly making its way into the customer experience, most notably in menus at Seasons 52 which include organic food, local sourcing, and smaller portions.

The Sustainability Buildings Working Group is working now to develop a plan outlining initiatives that allow the company to continue to exceed its water conservation goal and meet its energy efficiency goal. Darden will likely establish goals for 2020 related to both energy and water reductions after they have reached their 2015 goals; therefore, the process of setting goals for beyond 2015 has not yet begun.

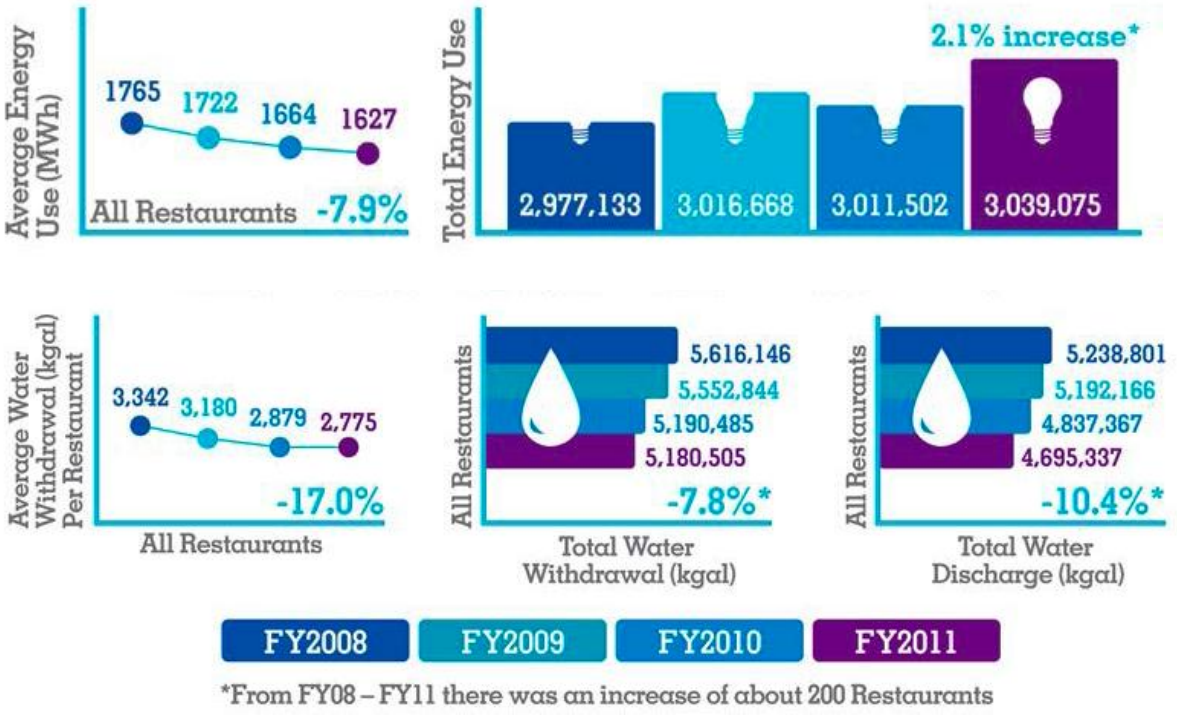
Program Performance

Darden's largest immediate success so far has been with its water saving goal. Results include a 17% decrease in per restaurant water withdrawals, from 3.342 to 2.775 million gallons annually, from 2008 to 2011. These results have surpassed the goals set for 2015 four years early. Additionally the company achieved water savings for the entirety of its restaurant operations, decreases of 7.8% for total water withdrawals (from 5.616 to 5.181 billion gallons annually) and 10.4% for total water discharge (from

5.239 to 4.695 billion gallons annually), even as new restaurants were opened up during the period. Over the period these savings amounted to over 1 billion gallons of water use avoided.

Darden also achieved consistent annual decreases in per restaurant energy consumption from 2008 to 2011, totaling a 7.9% decrease from 1,765 to 1,627 MWh annual averages over the period. However, over this period total energy use increased by 2.1% (from 2,977 to 3,039 GWh annually), largely as a result of 200 new restaurants opened.

Figure 2. Energy and Water Use by Darden Restaurants



Source: http://darden.com/sustainability/downloads/2012-gri-full.pdf

Reductions in greenhouse gas emissions per restaurant went from 608 metric tons equivalent of carbon dioxide in 2008 to 568 in 2011. However, total emissions increased around 3.1% over the period from 1,060,613 to 1,093,975 metric tons of carbon dioxide equivalent (including Scope 1 and 2 emissions only). By 2015 the company projects a net increase in absolute greenhouse gas emissions of about 8%, even while achieving the 15% per restaurant energy and water savings goals, primarily due to expansion and new restaurants opening. The water, energy and carbon analyses were completed by Deloitte in 2012. They evaluated energy and water utility data provided by Ecova for submission to the Carbon Disclosure Project. The analysis followed the greenhouse gas inventory established in *The Greenhouse Gas Protocol: A Corporate Accounting and Report Standard (Revised Edition)* (WBCSD & WRI 2004). The off-site energy embedded in water used is not included in energy savings calculations.

Darden's sustainability efforts have been acknowledged by several independent disclosure and ratings efforts. The company received a disclosure score of 79 out of 100 from the Carbon Disclosure Project in 2011 that score improved to 80 in 2012. In both years the company received a "C" grade for carbon performance. While mediocre among all S&P 500 companies this score is the highest rating among the restaurants companies included in the consumer discretionary sector (CDP 2012). The company also scored 49 out of 100 in the 2012 Climate Counts rating, a large improvement from the score of 0 in 2008 (Climate Counts 2012). The company also self-declared as scoring a C on the Global Reporting Initiative Application (Darden 2012).

Since the programs began in 2009, Darden has invested approximately $10 million in capital, but realized over $20 million in savings. The company reports a cumulative $18 million in cost savings from Sustainability efforts from FY2008 to FY 2011 and they project an additional savings between $10 and $12 million for FY 2012 to FY2016. The most cost-effective and high impact measures have included LED lighting replacements and additions in the front of house; change of pasta cookers to more energy and water efficient models; and equipment power-up and power-down schedules.

Lessons Learned

- *Early successes are the easiest*—Identifying energy and water savings was a fairly easy proposition at the outset. Many of the projects required fairly simple solutions that enabled the company to reduce environmental impact and quickly realize real cost savings. As the company advances, creating more sustainable restaurants is becoming more challenging. For example, restaurants of one Darden brand had lighting system dimmer panels that were not able to work successfully with LED lighting without more comprehensive additional investments.
- *Partnerships with equipment manufacturers*—The kitchen equipment team partnered with several manufacturers of refrigeration, preparation, and cooking equipment to find new and innovative ways to reduce the company's resource use. This has led to several custom solutions that reduce the natural resource needs and often make the work of employees easier.
- *Peer exchange and learning*—Darden is actively engaged in a number of organizations where they can share their experiences and learn about new technologies in the industry. This enables employees to identify and test new solutions in the business. Darden is actively engaged with the National Restaurant Association's CONSERVE program, National Association of Energy Managers (NAEM), U.S. Green Building Council, the U.S. Environmental Protection Agency, is a founding member of the Sustainability Consortium, and reports annually to the Carbon Disclosure Project.
- *Systematic pilot, test and scale process*—Darden owns and operates all 2,000 of their restaurants, enabling them to quickly adopt new resource saving measures and scaling them throughout the enterprise. Darden has developed a three-step pilot, test, and scale methodology to evaluate all changes in operations. This provides the Sustainable Buildings Working Group with the ability to advance sustainability solutions in a step-wise fashion enabling leadership to see the impact to overall operations, test the financial models, and address any potential issues that could derail the project. If any projects fail any one of these three tests during the pilot, test or scaling phase, they can be stopped and analyzed.

- *Enable comprehensive implementation*—Darden's adoption of LEED prototypes for all new construction has made their new restaurants among the most efficient in the industry. Given the comprehensive considerations given to these new buildings, Darden is able to test many new technologies and achieve high levels of energy savings.
- *Performance monitoring and feedback*—Darden's investment in utility monitoring and energy management systems in 2013 will enable them to better understand the specific equipment and initiatives making an impact in restaurant operations. Up until now, they have only been able to easily evaluate the financial and environmental impact of projects at the measure level. In the future, more robust data from a utility monitoring system will empower corporate and restaurant-level leadership to make more educated decision about how they can reduce water and energy use in all systems.
- *Balancing efficiency and performance*—A primary consideration is to identify solutions that do not compromise food quality or safety to ensure the health and satisfaction of customers. As a result in several areas Darden has not yet identified appropriate resource saving technologies. For example, Darden continues to test alternatives to steamer equipment that delivers the product guests have come to expect while significantly reducing the demand of energy and water.

Additional Resources

Darden Sustainability 2012 Report
http://darden.com/sustainability/downloads/2012-gri-full.pdf

Darden submissions to the Carbon Disclosure Project

- 2012 Information Request: http://darden.com/sustainability/downloads/cdp-2012-investor-cdp-2012-information-request.pdf
- 2012 Water Disclosure: http://darden.com/sustainability/downloads/cdp-2012-water-disclosure-cdp-2012-information-request.pdf

ENERGY PERFORMANCE CONTRACTING PROGRAM

City of Boulder, Colorado

Program at a Glance	
Location: City of Boulder, Colorado	*Financial Savings and Other Program Results*: $667,614 in annual utility cost savings, 8,216 metric tons of CO2 avoided annually, $3.4 million decrease in deferred capital costs and $50,000 savings on maintenance costs. 120-200 jobs created or retained.
Sector/Customer Segment: Corporate/ Government/ Institutional Sustainability	*Budget and Funding Sources*: $16.2 million invested over 4 years with 13-15 year debt. EPC financing, Qualified Energy Conservation Bonds (QECBs), Xcel rebates, Colorado Carbon Fund Grant, Energy Efficiency and Conservation Block Grant (EECBG), city capital
Program Start (and End) Date: June 2009	*Contact Person:* Joe Castro Facilities and Fleet Manager castroj@bouldercolorado.gov (303) 441-3163
Annual Energy and Water Savings: 7,883,532 kWh, 180,680 therms of natural gas, and 2,796,000 gallons of water	*Program Website*: http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=13734&Itemid=2092

Program Description

Public buildings are often large energy users, old, and in need of rehabilitation. In addition to these physical opportunities, due to being publicly owned they are long-term assets for which building improvements can be financed over a long period of time and they provide a significant opportunity to demonstrate energy efficient technologies and practices to the general public through a public institution "leading by example."

In 2009, the City of Boulder, Colorado chose to improve the energy and water performance of 66 of 330 city owned facilities accounting for 1.5 million square feet, representing over 90% of total energy use from city operations. In June of that year the City formally partnered with the Energy Performance Contract (EPC) program managed by the Colorado Governor's Energy Office to select an energy service company (ESCO). The state program had prescreened and preapproved 13 ESCOs, 10 of which responded to the City's request for proposals. After interviewing five candidate companies, Boulder eventually selected McKinstry Essention to fill this role, primarily because of their experience with other local governments near Boulder and their use of non-proprietary energy management software compatible with the City's existing multiple-vendor building systems. As a result of the energy and water improvements made over four years more than 7.8 GWh of electricity,

180,000 therms of natural gas, and 2.7 million gallons of water are saved annually resulting in over $660,000 in utility cost savings each year. Boulder's program is a good example of pushing the boundaries of EPCs to achieve energy and water savings.

Boulder's efforts emerged out of a variety of motivations including funding opportunities, potential cost savings and the contributions they could provide to aggressive community-wide energy- and climate action-related goals. In 2009, the City of Boulder formed an internal Energy Strategy Team and developed the following goals for energy efficiency:

- Reduce energy use, water use and costs across all city operations;
- Upgrade aging infrastructure in a fiscally constrained funding environment (deferred maintenance had continued to increase with no relief in sight);
- Reduce greenhouse gas emissions by 20% to meet the 7% reductions from 1990 levels per the Kyoto Protocols;
- Leverage the American Recovery and Reinvestment Act, State and utility funding opportunities;
- Improve comfort, aesthetics, productivity;
- Incorporate renewable technology and maximize demand side management opportunities with smart grid initiatives;
- Add/improve building automation systems; and
- Lead by example.

The City has long considered energy efficiency an important part of its efforts reducing greenhouse gas emissions. One of the most important actions to this effect was the adoption of City Council Resolution 906 in January 2002, stating: "the council intends for the city to take a leadership role in increasing energy efficiency and reducing greenhouse gas emissions from municipal operations." This resolution eventually led to the development of the City's 2006 Climate Action Plan which expanded on the role of government operations in reducing city-wide emissions.

Energy performance contracting is a financing mechanism that has become common for use with public building improvement projects. EPC enables building improvements to be paid for from cost savings in future utility bills over a multi-year period up to 20 years. Through a lease purchase agreement an energy service company (ESCo) pays the upfront costs of the investments and guarantees a certain level of reductions in energy and/or water consumption. The city or other contracting entity is then responsible for making payments on the investment based on the resource and cost savings achieved. When the investment is paid off the city becomes the exclusive beneficiary of the reduced utility costs. EPC is popular with governments at all levels and other public entities in large part because it requires minimal upfront public investment or taxpayer dollars.

Boulder's efforts pushed the EPC model beyond standard practice. They approached the process from a comprehensive perspective incorporating all of their public buildings and all systems in the buildings. Additionally because the city's interests in the energy and water improvements went well beyond the cost savings benefits and the city had several low cost funding sources available to them, they were willing to invest in measures with much longer payback periods. Also, this thinking allowed

them to integrate renewable energy technology for on-site energy generation, despite the very high upfront costs associated with the systems relative to the efficiency measures. The combined projects completed under the program has a simple payback over 18 years; however, with their ESCo aggressively seeking grant and rebate opportunities, 17% of the program is being funded by others, reducing the financing period to 15 years. Finally, the program will also go beyond typical physical efficiency interventions through funding the integration of an energy management system and behavioral and operations training for employees.

Potential energy efficiency measures were considered independently and as a whole based on return on investment (ROI) criteria. Thresholds for a 20-year ROI were acceptable to the city to enable deep energy savings to meet the city's GHG emissions reduction and EPC program goals; however, financing rates were lowest at the 15-year point. As long as the overall ROI could meet a financing period of 15-years, that was acceptable to the city. Because the city owns and leases many facilities, facilities with less than $2,000 in annual utility bills were excluded from project consideration in order to focus on the buildings with the largest savings opportunities.

To date the City's EPC efforts have consisted of three phases totaling over $16 million in investments. The first phase and second phases were implemented from late 2010 through early 2012. These two phases consisted of comprehensive building audits, building envelope weatherization, improvements in lighting and controls, replacement of heating, ventilation and air conditioning (HVAC) equipment, building retrocommissioning, water conservation measures to faucets and fixtures, and solar photovoltaic or solar thermal installations at nearly a dozen municipal buildings. The third phase began construction in February 2012 and is estimated to be complete in 2013. It will install an additional $3.1 million worth of building improvements including HVAC and lighting upgrades. Additionally, this phase is focused more on energy management investments rather than physical energy improvements, including employee and public education programs (including a "dashboard" to display publicly the progress made in energy use savings in government operations) and installation of building energy monitoring and management systems to ensure the buildings continue to operate properly and achieve a high level of energy savings.

Across all phases of the projects, specific improvements implemented include:

- Auditing building envelopes of 57 buildings, weatherization improvements to 43 buildings;
- Installations of indoor and outdoor lighting improvements and controls (occupancy sensors) for several buildings, a recreation field and bike paths;
- Replacement of equipment, including chillers, boilers, and air handlers often including variable frequency drives and controls, estimated to be equivalent to $1,830,000 in avoided future costs;
- Retrocommissioning of several buildings to ensure optimal systems performance and occupant comfort, integration of controls and system scheduling;
- Water efficiency audits to 57 buildings and irrigation systems, installation of low-flow devices at over 1,500 fixtures with a focus on adjustments and replacement of valves for existing fixtures versus whole fixture replacements—saving 2,790,000 gallons annually;
- Installation of 1.1 MW of solar photovoltaic panels at 12 buildings;

- Installation of solar thermal systems for heating swimming pools at two recreation centers, providing the equivalent of 19,300 therms per year total;
- Integration of automation systems for real-time energy management in 28 buildings, those accounting for 86% of energy use in city facilities;
- *powerED* energy awareness and energy behavior training program for employees.

The projects were primarily funded through McKinstry's EPC, which financed $9.6 million of the project costs. The city also applied its owns resources including two federal allocations, an Energy Efficiency and Conservation Block Grant and Qualified Energy Conservation Bonds (QECBs), as well as $1.5 million in the city's own capital from its Facilities Replacement Fund. Finally, incentives from Xcel bought down the cost of the efficiency and solar measures and a carbon offset from the Colorado Carbon Fund monetized some of the environmental value of the projects. Detailed project finance numbers are included in Table 4.

Table 4. Energy Performance Contracting Program Costs

	Phase 1	Phase 2	Phase 3	Total
Total Project Costs	$2,888,711	$8,138,999	$5,205,250	$16,232,960
- Xcel Energy Solar PV Rewards Rebate	($632,064)	($778,900)	($75,000)	($1,485,964)
- Xcel Energy Standard Offer Rebate	($80,885)	($417,230)	($58,878)	($556,993)
Project Cost to City of Boulder	$2,175,762	$6,942,869	$5,071,372[2]	$14,190,003
- Energy Efficiency and Conservation Block Grant	($213,501)	($146,499)	--	($360,000)
- City Capital	($462,261)	($398,337)	($1,524,460)[3]	($2,385,058)
- Colorado Carbon Fund		($50,000)		
- Financed Amount	($1,500,000) QECBs[1] @1.46%–13Y	($6,398,033) McKinstry @3.5% (refi to 2.65%)–15Y	($3,241,230) McKinstry @2.65%–15Y	$11,139,262

Sources: http://climatecommunities.us/documents/summit_castro.pdf and http://www.bouldercolorado.gov/files/City%20Council/Agendas/2012/January_3_COMBINED_agenda.pdf

Notes: 1. QECBs are Qualified Energy Conservation Bonds, 2. Includes costs for publicly owned and leased buildings, 3. The City's Fleet Replacement Fund is the source of capital for projects in leased buildings and will be repaid to the City by tenants of the buildings.

Program Performance

In an energy performance contract resource savings are guaranteed by the energy service company, in Boulder's case McKinstry. The energy savings were conservatively calculated by McKinstry through

comparing manufacturer's rated equipment efficiencies versus efficiencies of existing systems. However, since water service is currently not billed for city facilities, water and energy savings associated with water use reductions were not included in the guaranteed savings. Energy utility cost savings from the EPC were estimated at nearly $668,000 annually, a 22% savings on the city's annual utility bill of $3 million. Detailed benefits are described in Table 5.

Table 5. Energy Performance Contracting Program Annual Results.

Annual Results	Phase 1	Phase 2	Phase 3	Total
Electricity savings (kWh)	1,299,795	4,440,363	2,143,374	7,883,532
Natural gas savings (therms)	7,868	155,708	17,104	180,680
Water savings (gallons)	-	2,796,000	-	2,796,000
Utility Cost Savings (annual)	$87,759	$419,745	$160,110	$667,614
Maintenance Cost Savings (3-years only)	$4,805	$42,386	$5,424	$52,615
CO_2 emissions reduction (metric tons annually)	1,152	4,620	2,444	8,216
Future capital costs avoided (one-time)	$546,000	$1,287,000	$1,524,460	$3,354,460
On-going incentives:				
PV REC payments (annual)	$31,565	$21,355	$44,142	$97,062
CCF REC payments (one-time)		$50,000		$50,000

Sources: http://climatecommunities.us/documents/summit_castro.pdf and http://www.bouldercolorado.gov/files/City%20Council/Agendas/2012/January_3_COMBINED_agenda.pdf

The energy and water saving from the EPC are significant, even in comparison to the City's total energy consumption. In the City's 2008 baseline, the government operations of the city annually consumed 31.3 GWh of electricity and 950,000 therms of natural gas contributing to 33,710 metric tons of CO2 emissions. In 2011, city operations consumed over 35 million gallons of water indoors. The energy efficiency investments included in the EPC are guaranteed to result in over 5.6 GWh and 157,000 therms in annual savings, 17.9% and 16.5% respectively. The solar investments will avoid the consumption of an additional 1.4 GWh and 8,700 therms of offsite energy. In total 22.5% of electric and 17.4% of natural gas baseline consumption will be avoided resulting in 8,216 metric tons of CO2 avoided, or 24.4% of the 2008 baseline. Additionally the water savings measures included in the EPC will result in annual savings of nearly 2.8 million gallons, around 8% of all indoor consumption in city facilities.

Additional estimated benefits of the project include the creation or retention of between 120-200 at McKinstry, with local subcontractors and in the manufacturing of equipment. Perhaps most

importantly from the City's perspective, the EPC reduced the backlog for equipment replacement and other capital expenditure needs by $3.4 million at no cost to taxpayers. Additionally, maintenance cost savings in the first three years were more than $50,000 and further savings are expected in future years because of the new equipment. McKinstry has consistently received high marks from City staff through customer feedback surveys administered throughout the project.

Lessons Learned

City of Boulder has used the EPC program to implement a combination of both energy and water conservation measures and renewable energy technologies to significantly reduce carbon emissions and costs, going beyond the typical energy performance contract. Elements that made this possible include:

- *Partnership with state government ESCO clearinghouse*—A partnership between the City of Boulder and the Colorado Governor's Energy Office was important to enable the use of the energy performance contract mechanism. The state had developed a formalized energy performance contracting program in order to pre-screen ESCOs for approved use by government entities within the state. The statewide program makes Boulder's use of EPC transferable to all government entities in Colorado and provides a model for state-local collaboration for other states.
- *Expanding the objectives for energy performance investments beyond energy savings alone*—Boulder's broad goals, ranging from climate action to reducing its deferred maintenance backlog to comfort and productivity, enabled them to make a big investment leading to big, long-term benefits. Because important decision-makers and stakeholders recognized the variety of possible benefits, investments that were larger, longer and deeper and which had broader benefits became possible. Also, although an overall positive savings is being realized by the program, it was important to document and show how each city department was affected financially, whether positive or negatively, in order to address uncertainty about the EPC model among city staff and officials.
- *Stretching the possibilities for EPC projects*—Boulder's performance contract demonstrated the successful integration of several measures not found in typical EPCs. These included water saving measures (even without associated utility cost savings), behavioral training, building performance and monitoring systems, and renewable energy technologies with long payback periods. Also included in Phase 3 of the project were investments in tenant-occupied facilities where the city, as the landlord, made the initial investments and the tenants will make payments from their guaranteed annual savings. As the value of these measures play out over the coming years, they maybe begin to be integrated into EPC projects more widely. In recognition of its leadership in this area, the city received an award for this project in January 2011 from the Colorado Chapter of the American Public Works Association.
- *Financing projects with long payback periods*—Commitment to measures with high upfront costs and long payback periods meant that, one significant barrier was getting financing for a 15-20 year loan. The City overcame this barrier by developing a project with a portfolio of measures that could achieve a 15-year payback and loan term with the help of city matching

funds. In addition, in the third phase focus shifted toward maintaining this investment and making sure that everything was working as it should to achieve the guaranteed savings.

- *Prioritizing investments in operational efficiency*—Boulder recognized that investments in maintaining energy savings are equally, if not more, important than measure installation. The city did not want to have the best energy performance on the day that the Phase 3 construction was completed, with it deteriorating thereafter. As a result, included the last phase of the EPC were smart building controls and remote monitoring for 28 key facilities. These tools will allow a continuous commissioning program that could result in future additional phases added in to take advantage of more efficient and advanced technologies. As maintenance employees are trained, the objectives are to move to a higher level of preventive maintenance, then onto predictive maintenance, and then to proactive maintenance to constantly improve the energy performance of city facilities. Also, unique to Boulder's program is the employee energy awareness and behavior change program, which is being piloted in Boulder and will be made available to other municipalities. A total of 28 buildings will be part of the employee training and behavior program. These 28 buildings represent more than 80% of the city operation's total energy use and impact nearly all 1,300 city employees. Although there are no guaranteed savings from the education program, the city has set a goal of 10% additional energy savings through it, which if successfully documented could potential be integrated into the financing of future EPCs.

Additional Resources

An introduction to energy performance contracting:
http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf

A presentation with additional details on Boulder's EPC:
http://climatecommunities.us/documents/summit_castro.pdf

Further information on the Colorado Energy Office's Energy Performance Contracting program:
http://www.colorado.gov/cs/Satellite/GovEnergyOffice/CBON/1251599983018

City of Boulder's water consumption inventory:
http://www.bouldercolorado.gov/files/Utilities/WRAB/2012/2012-7/Agenda%205%20PR%20Water%20Budget%20memo%20with%20attach.pdf

LONG-TERM SUSTAINABILITY PROGRAM

Massachusetts Water Resources Authority (MWRA)

Program at a Glance	
Location: Massachusetts	*Financial Savings and Other Program Results:* $350 million in avoided customer costs from water efficiency, $24 million in savings annually from energy management, low carbon intensity of water system, improved environmental quality of rivers and aquifers, reduced supply constraints and new economic development possibilities
Sector/Customer Segment: Corporate/ Government/ Institutional Sustainability	*Budget and Funding Sources*: $440,000 budget for water and energy programs in FY2012
Pr*ogram Start (and End) Date:* March 1987	*Contact Person*: Stephen Estes-Smargiassi Director, Planning, smargias@mwra.state.ma.us (617) 788-4303
Annual Energy and Water Savings: 46,108,600 kWh, 1200 kW electric capacity and, 6,983,130 therms natural gas savings from energy efficiency investments, 140 MGD water savings from water efficiency activities (a 41% reduction over 1980).	*Program Website*: http://www.mwra.com/comsupport/waterconservationmain.htm

Program Description

The Massachusetts Water Resources Authority (MWRA) has pursued both water and energy efficiency initiatives since its establishment in 1984. Originally developed as a water efficiency only effort, MWRA's Long Range Water Supply Program has evolved over time into an overarching "long-term sustainability program" focused on controlling costs for customers and environmental sustainability through active management of water and energy resources. MWRA's efficiency efforts provide a good example of a water utility successfully managing customer costs and providing environmental benefits through prioritizing demand side management to achieve large water and energy savings, avoid capacity expansions, and decrease operating expenses.

MWRA is an independent public authority established to provide wholesale water and sewer utility services. The authority provides service to 61 municipalities in the Boston metropolitan region, 2.5 million people and more than 5,500 large industrial users. In 2011 the system supplied an average of 195 million gallons per day (MGD) of potable water and in recent years has treated an average of 350 million gallons of sewage per day. In the course of providing its water service in 2011 the authority consumed approximately 210 GWh of electricity and 493,250 therms of natural gas (and just over 1 million gallons of fuel oils and gasoline).

MWRA's efficiency efforts fall into four general areas: customer water efficiency program, system optimization for water efficiency; system optimization for energy efficiency, and efficient energy generation from water resources.

CUSTOMER WATER EFFICIENCY The MWRA water conservation program takes a "reservoir to tap" efficiency approach to avoid the need for developing new water resources and constructing new infrastructure and control costs for ratepayers. Most water conservation efforts are conducted cooperatively MWRA's 61 member communities. MWRA provides direct conservation services to individuals and businesses, as well as supporting efforts of cities and towns.

The program was started in 1987 as a response to almost a decade of water use exceeding the safe yield of the reservoir system. Throughout much of the 1980s demand hovered around 340 MGD compared to a safe demand level of only 300 MGD. A multi-year alternatives search and environmental review initiated by the agency's predecessor, the Metropolitan District Commission, examined nine major alternatives, and many believed that the only feasible solution was a 70 MGD capacity diversion of flow from the Connecticut River. The diversion was formally approved by the state legislature, and extensive engineering and construction had already been undertaken. However, the river diversion faced substantial local and regional opposition, and the MWRA Board of Directors choose in 1986 and 1987 to direct staff to instead approach the problem from the perspective of improving efficiency and conduct a full scale demand management program to determine if demand could reliably be brought below the safe yield. The program was budgeted $34 million over a 5 year period, with an evaluation due after 3 years. The original program included 25 separate programs designed to manage demand from the reservoirs to the consumer's taps and to protect existing supplies from being lost due to contamination. Many of these programs continue to this day or have been otherwise integrated into ongoing operations.

Customer-centered water efficiency efforts implemented by MWRA have included:

- Industrial, Commercial and Institutional audit and outreach programs;
- Direct install retrofit for residential customers;
- Outreach and educational programs—through advertisements and school programs;
- Supporting the adoption of a 1.6 gallon per flush toilet standard in Massachusetts in 1989, the first state to do so, and helping with its implementation through a toilet retrofit program.

One early residential program was Operation WaterSense a program, implemented in partnership with MWRA member communities from 1988 to 1993 that used a community-by-community blitz approach to visit a neighborhood and do immediate no-cost direct install of devices including showerheads, faucet aerators, toilet dams and leak detection. This approach was chosen after a pilot testing other outreach methods, including door hangers and customer scheduled appointments that resulted in lower impacts. Additionally the program was designed to make payments to contractors conditional on documented installation of an appropriate mix of devices, not just a single type, guaranteeing actual use of the devices and water savings from a variety of household uses. The program achieved a 59% participation rate and 95% customer satisfaction. Operation WaterSense continues to provide low-flow device kits but is no longer a direct install program.

WATER SYSTEM EFFICIENCY The water distribution and wastewater systems maintained by MWRA and its member communities have also been the focus of significant water management efforts, including:

- Leak detection and repair for MWRA's and customer communities' distribution systems;
- Rehabilitation and repair of MWRA and community distribution systems;
- Demand management requirements on customer communities;
- Improved water metering and monitoring;

MWRA established a leak detection and repair program in 1987. By 1990 they had found and fixed more than 5 MGD of leakage in their own system. They now have leak detection and repair integrated into a routine survey of their systems. All 286 miles of MWRA pipes are inspected every year and repairs are made immediately when leaks are found, resulting in an additional savings of 0.60 MGD each year. As the wholesale supplier, MWRA's water flows into the distribution systems of its member communities, which account a much larger portion of potentially leaky pipes in the overall system. MWRA also works with its member communities to identify leaks in their systems. Between 1988 and 1990 MWRA surveyed 6,085 miles of community pipes and worked with the communities to repair over 2,300 leaks which were resulting in 30 MGD of water losses. A one-time follow-up resulted in another 0.7 MGD in savings. Since these initial efforts MWRA has implemented new regulations that require member communities to complete a leak detection survey of their entire system at least once every two years. Although savings from the surveys have decreased somewhat the water savings remain significant and continue to outweigh the cost of the surveys. For example, the 2001-03 survey resulted in savings of 9.20 MGD.

Beyond leak detection other efforts also contribute to system water savings. Rehabilitation and replacement of distribution system components supported by MWRA are primarily focused on improved water quality and system reliability but also provide reductions in leakage. Tracking and analysis of data from MWRA's meters also helps to identify potential leakages in the systems. On the wastewater and stormwater side of the equation, MWRA supports efforts by its member communities to reduce combined sewer overflow and emerging efforts like green infrastructure to reduce wastewater treatment needs that result from decreased overflow. All of these water savings have energy impacts as they result in reduced energy needs for pumping and the eventual treatment of resulting wastewater.

MWRA's initial water savings target has now been more than achieved. As a result the programs they provide have been adjusted accounting for success and have shifted along the cost-effectiveness curve. Because additional water savings are not currently contributing to significant additional avoided costs (such as the development of a new water source), high cost programs, such direct install efforts have been deemphasized. However, almost all programs continue to be provided at no cost to customers.

ENERGY MANAGEMENT AND EFFICIENT ENERGY GENERATION After its success with water efficiency efforts to deliver cost management and environmental benefits, MWRA developed a growing focus on energy efficiency and optimization throughout the regional system and a commitment to implementing cost-effective renewable energy projects at all available locations. Energy is a large fraction of the authority's variable cost, ranging between 8.4% and 9.9% ($15 million to $20 million) of MWRA's direct expenses

in most years since 2002. Efficiency efforts have included all fuels but have focused on electricity because it accounts for the vast majority of energy costs. The growing focus on energy management is an evolution and acceleration of an ongoing interest. MWRA's predecessors have used hydropower since the 1890s but MWRA has begun thinking more broadly in the past few years, expanding its clean energy generation efforts in part as a result of the Commonwealth of Massachusetts increasing its focused on climate change mitigation and green energy investments.

MWRA has completed facility energy audits at 28 of its 36 major facilities, implemented process optimization and installed efficient lighting and equipment, resulting in savings of 8 GWh and $1,700,000 in fiscal year 2011. Additional efficiency projects planned for implementation in 2012 include energy audits for all eight of the remaining unaudited facilities, adding ventilation setbacks at four facilities, new energy management systems at two facilities to optimize HVA equipment use, and expanded use of SCADA for energy management considerations in process controls. MWRA also participates in remand response programs and has operating protocols that reduce monthly and annual peak energy demands.

MWRA has a policy of siting renewable energy assets at their facilities when economically feasible. This is in part a result of Executive Order 484 issued by Governor Patrick in 2007. Energy generation by MWRA now provides for almost half of the authority's power needs. Currently methane capture co-generation annually replaces approximately 5 million gallons of diesel fuel ($15 million savings) used for process heating (thermal energy) and over 27 million kWh ($2.8 million savings) in electricity. Hydroelectric power production provides 23 GWh ($1.8 million savings), while wind and solar annually provide 5 GWh ($580,000 savings) and 1.4 GWh ($240,000 savings) respectively. With the exception of the solar and wind generation these energy generation technologies are directly utilizing the energy embodied in the system's water and wastewater resources that would otherwise go to waste. The authority continues to identify new ways to capture energy as water is moves from higher to lower elevations. The Deer Island Treatment Plant, completed in 2000, was designed for methane capture and its operators have continued to improve its efficiency, now at around 98%. Further documentation on water and energy efficiency programs is listed in the Additional Resources section.

Funding for MWRA's water and energy management investments come from various sources. Water efficiency activities are funded on an annual basis with a conservation line item. Energy investments are either funded under the authority's maintenance line item if they are low-cost energy management activities, but large capital energy expenditures are budgeted for in the 10 year capital budget. Annual MWRA efficiency expenditures, not counting external funding sources, totaled $440,000 in the FY2012 budget. More than 80% of this was devoted to investments with primarily energy benefits and the remainder was targeted toward in water savings. All funds for water conservation programs come from rates paid by customer communities. In addition to rates, grants from federal, state or utility programs have been used for some energy projects. The authority has successfully leveraged various incentives and low-cost capital sources to put toward its energy projects. MWRA has been awarded a total of $2.3 million in grants, including $680,000 in utility rebates for energy efficiency projects, and received $9.2 million in principal forgiveness loans through the American Recovery and Reinvestment Act of 2009 (ARRA) for on-site renewable energy projects.

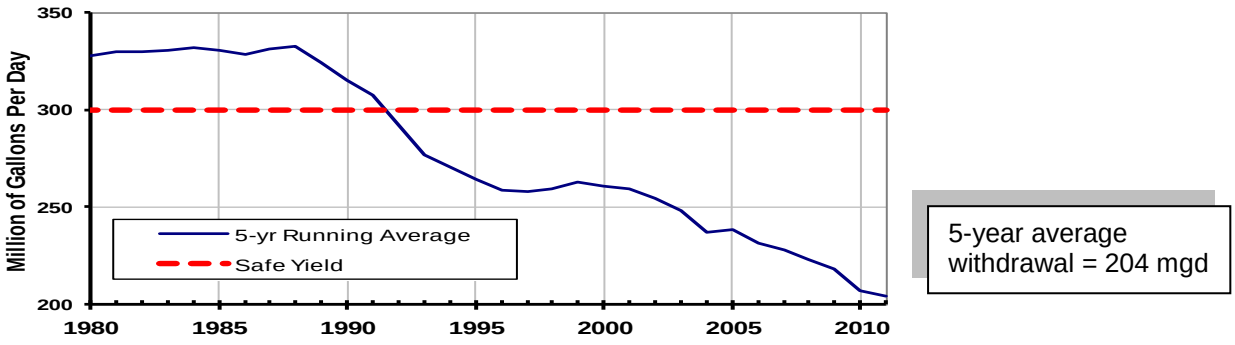
Budgeting and investments are primarily managed by senior staff and the Board of Directors. Substantial input is also derived from advisory groups. The Advisory Board is made up of the CEOs of each of the customer communities and provides both policy and financial oversight. Two citizen advisory groups, the Water Supply Citizens Advisory Committee and the Wastewater Advisory Committee, provide policy advice.

Program Performance

Out of the 2.3 million end use customers eligible to participate in water efficiency programs, approximately 1 million have done so. All of MWRA's member communities participate in water saving programs. These shared efforts to achieve water savings, successfully avoided development of new supply, and freed up water resources to serve new communities in the region allowing them to reduce dependence on stressed rivers and aquifers.

Over the 25 years since its inception, MWRA water demand has dropped by over 40% from 340 MGD to around 200 MGD. During that period the original service area population grew by 183,000 and MWRA was able to expand its service area to six additional communities with stressed supplies adding an additional population of 135,000. MWRA's largest customer, the city of Boston, has reduced its demand from 150 MGD to 67 MGD, less than it used in 1900, while increasing in population and economic activity. These water savings benefits combined with the energy production benefits have led to direct energy savings for MWRA of 46.1 GWh and 6,983,000 therms of natural gas per year (equivalent to 22% and 1400% of total 2011 usage respectively), and 1,200 kW in avoided electricity capacity, resulting in reduced costs for partner communities and customers. These numbers do not account for energy savings that directly accrue to other actors benefiting from MWRA's programs. In many cases member communities, households and businesses are also achieving energy cost savings resulting from water savings. Of the remaining energy demands of the water system, approximately half are produced from renewable sources, many of them taking advantage of the energy value in the water itself.

Figure 3. MWRA System Demand Decreases from 340 MGD to 200 MGD



Source: http://www.mwra.com/04water/html/waterusetrends/2011waterusetrendsreport.pdf

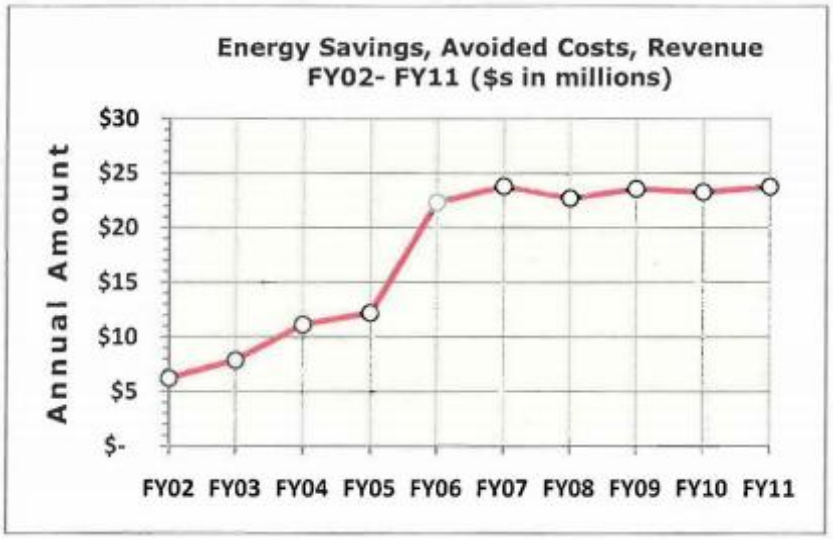
Beyond energy cost savings, the water demand management efforts have resulted in significant avoided costs over the 25 years, many times the approximately $30 million in total investments made. The elimination of the need for a new source, the Connecticut River diversion, was worth $120 to

$220 million (1990 dollars). The reduced demand allowed for a reduction in the size of the new drinking water treatment plant, saving $50 to $80 million and avoiding the river diversion allowed MWRA to remain an unfiltered water system resulting in an additional savings of at least $180 million in construction costs, plus $3.6 million in operating costs per year (1998 dollars). In all, these cost reductions are worth at least $350 million. As an additional bonus, future costs have also been significantly curtailed: new water supply investments are now off the table for the foreseeable future, out to the far boundaries of MWRA's 40 year prospective long-range planning.

The system energy efficiency efforts over the past 5 years have resulted in an annual savings of $1,948,600 with one time capital investments totaling only $2,026,100, an average payback period of just over one year. MWRA's current investments now often have 3-7 year payback but staff there feel that they are still only collecting the "low hanging fruit" of available energy savings.

Total energy management related savings on energy costs—including energy efficiency as well as demand response, revenue from on-site generation, avoided costs, and competitive bidding for power supply—are now in the range of $24 million annually as shown in Figure 4.

Figure 4. Net Annual Financial Gain



Source: http://www.mwra.com/05energy/pdf/2012/011812-energystaffsummary.pdf

Other benefits of MWRA's programs include economic development impacts, reduced greenhouse gas emissions, and improvements in water flow and environmental quality in local watersheds and coastal areas. MWRA believes that the reduction in water demand and costs has made a significant contribution toward making the Boston metropolitan area an attractive business location. Savings from avoided development of new infrastructure can instead go toward rehabilitation and improvements of existing infrastructure a much lower costs. With current and projected demands, MWRA is able to practically guarantee that there will be no drought restrictions even in the worst drought on record. Many neighboring metro areas routinely suffer from drought and must restrict demand. One community which joined MWRA in 2003 immediately found that the ability to provide

additional water created new development opportunities resulting in a significant expansion of their business base including the location of an IKEA store within the community.

The small energy demands of the water systems and high use of renewable energy also result in a small carbon footprint for the system. The water system has a carbon footprint of only 0.04 grams of CO_2/liter, or less than 1 ten-thousandth that of bottled water. One 500 mL bottle of average U.S. bottled water has the equivalent carbon footprint of over 2,100 gallons of MWRA water from the tap.

The dramatic reduction in demand has allowed MWRA and the region the opportunity to reduce water supply stress on the region's rivers and aquifers by re-evaluating existing supply arrangements. MWRA has already been able to extend service to two communities in the headwaters of the Ipswich River, one of the nation's 10 most endangered rivers due to over pumping. Taking damaging streamside wells off-line and substituting MWRA water means that the river no longer is pumped dry most summers. MWRA continues to work with state agencies and local environmental groups to determine how its conservation savings can be used to better the environment.

The second important benefit of the conservation programs has been ability to expand the MWRA service area, providing substantial regional environmental benefits. Based on their design and operation, MWRA's sources have a comparatively small environmental impact. MWRA has been able to extend service to a number of adjacent communities which drew their water from smaller more highly stressed river basins, without sacrificing reliability to its existing customers. Substituting MWRA water for those sources has allowed for increased stream flow, and in some cases prevented what had been regular dry periods in the Ipswich River. MWRA has an aggressive effort underway to work with state environmental agencies to use its freed up resources to ameliorate environmental stress caused by overdrafting by other water systems.

Lessons Learned

- *Systems perspective and approach to water and energy management*—Sometimes improving particular pieces of equipment will not achieve the best savings. Identifying and correcting improper or unnecessary uses can often produce even greater savings. One example from MWRA's experience was an audit of a water treatment plant which determined that chemicals were adequately dissolved without running the mixers. Turning the mixers off saved $240,000 annually without reducing performance. Similarly MWRA has reduced unnecessary heating and lighting through temperature sensors and alarms in its SCADA systems.
- *Be nimble and take advantage of available funds*—Be aware of funding available and be responsive and flexible to opportunities to capture value for strategic priorities. The availability of outside funds, such as ARRA programs and utility rebates, has made new efficiency and renewable energy projects possible.
- *Design programs using pilot experimentation, cost-effectiveness and contractor incentives*—MWRA pioneered the use of performance based programs and "a pay for performance" contract model for its Operation WaterSense program, ensuring a close connection between costs and water savings. The use of pilot efforts resulted in a program design that maximized customer participation (59% penetration) while minimizing costs per customer. Most water

efficiency programs prior to MWRA's focused simply on number of devices given away, rather than on those that could be reliably counted on as having been installed and working, or were simply designed to meet utility regulators mandates to spend a certain dollar amount per year. MWRA's program focused on cost per gallon actually measurably saved, and on total market penetration.

- *Directly engage senior management and Board of Directors in program progress*—Another clear contribution to success was the clear focus of senior management and Board of Directors on the implementation progress of the demand management programs. While this type of oversight was typical for large scale construction projects (like a new source), in many cases conservation programs were handled at a lower level of priority and authority. Instrumental in creating the conditions to prioritize demand side management was the existence and influence of a strong external, funded, citizen advisory group, the Water Supply Citizen Advisory Committee, to facilitate intergovernmental action, advocate for the program and actively monitor its progress.
- *Partner on market transformation policies to lock in savings achieved through programs*—MWRA pushed Massachusetts to be the first state to adopt 1.6 gallon per flush toilets as a standard, as part of an effort to move away from only direct governmental intervention and to allow the marketplace to provide on-going savings as homes and businesses were renovated.
- *Act and communicate to make customers feel good about their rate dollars*—MWRA's Operation WaterSense received 96% customer satisfaction in the 1980s, during a period of rapid rate increases resulting court ordered wastewater system improvements upgrades to the water system. Customers continue to express appreciation for MWRA's on-going efforts to provide them a measure of cost control in context of investment driven rate increases. As MWRA begins another period of infrastructure investment rates are expected to rise for next few years. But this time reduced water demand has enabled different and lower cost investment alternatives—a focus on rehabilitation of systems rather that expansion, reducing combined sewer overflows and environmental quality, and adding redundancy into the systems (adding water multiple paths) to increase reliability. Communicating the value of demand side management to end use customers can be difficult, especially because they do not see the full variety of benefits reflected in their rates. Because fixed costs of the water infrastructure is high, retailers often have volume based rates that go up with reduced demand. As a result MWRA has focused on its messaging on "controlling costs" and "saving water for the future" (which were popular in focus groups and survey work) rather than "saving money" for customers.

Additional Resources

Most recent annual water program review:
http://www.mwra.state.ma.us/harbor/pdf/demandreport.pdf

Summary of past water programs: http://www.mwra.state.ma.us/harbor/pdf/demandreport03.pdf

Article in Water Efficiency magazine overviewing MWRA water conservation efforts:
http://www.waterefficiency.net/WE/Articles/The_Secrets_of_Their_Success_556.aspx

Review of energy efficiency and renewable generation programs over the past decade:
http://www.mwra.com/05energy/pdf/2012/011812-energystaffsummary.pdf

Quarterly Management Indicators Report, see pages 1, 3, 10, and 26:
http://www.mwra.com/quarterly/orangenotebook/fy2012/q3.pdf

2015 SUSTAINABILITY GOALS

United Technologies Corporation (UTC)

Program at a Glance	
Location: Globally	*Financial Savings and Other Program Results:* 221,985 metric tons Co2e avoided, $55 million in energy costs and $700,000 in water costs from 2007-2011
Sector/Customer Segment: Corporate/ Government/ Institutional Sustainability	*Budget and Funding Sources:* Capital planning processes of each UTC business unit
Program Start (and End) Date: 1992, latest goals set in January 2006 and run through 2015	*Contact Person:* Sean West, Environmental Health and Safety Project Manager sean.west@utc.com (860) 728-7619
Annual Energy and Water Savings: 281,480,279 kwh, 129 million gallons from completed projects. Data for 2006-June 2012	*Program Website*: http://www.utc.com/Corporate+Responsibility/Environment/2015+Sustainability+Goals

Program Description

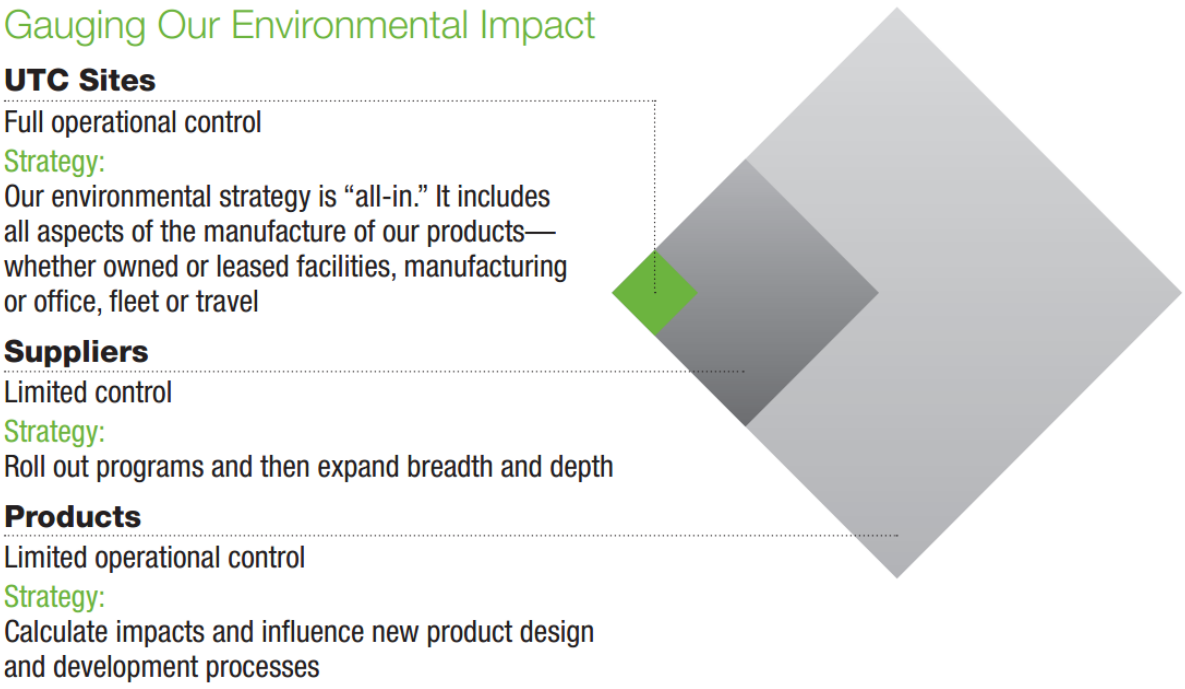
United Technologies Corporation (UTC) has had Environment, Health & Safety (EH&S) performance goals since 1992, including resource conservation goals. The motivation was to eliminate all forms of waste and to further develop a company culture built around continuous improvement and the efficient use of time, human resources, material and natural resources. UTC's original conservation plan called for the company to reduce both water and energy use by 25%, as a percent of sales, from 1997-2006. In 2006, UTC successfully closed out its prior goals to improve resource performance and set new sustainability goals for 2007 through 2015. Over time the EH&S conservation goals developed into sustainability goals that have a focus broader than company resource use alone. UTC's goals now include operational resource efficiency goals, greenhouse gas goals as well as product efficiency and supplier sustainability programs. UTC has committed to reduce water consumption by 40% and greenhouse gas emissions 27% in absolute terms by year-end 2015, compared to a 2006 baseline. Simultaneously UTC committed to identifying opportunities and to spend $100 million on energy efficiency projects including combined heat and power (or "co-generation"). UTC's efforts demonstrate the ability of mature energy and water management programs to still finding significant savings opportunities.

UTC provides innovative, high technology products and services to the aerospace and building system industries worldwide. UTC's industry-leading businesses include Otis elevators and escalators; UTC Climate, Controls & Security, a leading provider of heating, ventilation, air conditioning, fire and security systems, building automation and controls; Sikorsky aircrafts; and the new UTC

Propulsion & Aerospace Systems, which includes Pratt & Whitney aircraft engines and UTC Aerospace Systems aerospace products. UTC is a member of the Fortune 50 and the Dow Jones Industrial Average index, employing 220,000 people worldwide, with $63 billion[1] in revenues in 2011.

2010 marked the end of the first phase of the 2007-2015 goals, and UTC entered its current phase of sustainability goals. The goals have been established by the UTC Environment Health & Safety department and managed through the Senior EH&S council with representatives from all the business units. UTC's energy and water conservation programs are two components of the company's continuous improvement efforts. UTC has developed a culture that strives to eliminate waste of all kinds. Other environmentally-related goals include reductions in non-greenhouse gas emissions, total industrial process waste, and non-recycled industrial process waste. Beyond their own operations, UTC also includes supporting greenhouse gas emission reduction and energy efficiency efforts of their major suppliers among their sustainability goals, and a growing focus on efficiency in the design and operation of their products. UTC also recognizes they have significant but limited direct control over these external practices, as shown in Figure 5.

Figure 5. UTC's Realms of Influence and Levels of Control



Source: http://www.utc.com/StaticFiles/UTC/AnnualReports/2015_Sustainability_Goals/360_EHS_FactSheet.pdf

All UTC sites are required to perform energy assessments and a site water balance assessment (i.e., comparing local water resources to consumption) to identify significant energy and water uses and to

[1] UTC and Goodrich 2011 net sales excluding discounted operations; businesses held for sale due to regulatory requirements and sales between Goodrich and UTC.

identify conservation projects that will contribute to the goals. This information helps to prioritize the conservation opportunities that can have the largest impacts. Water conservation has always been a part of UTC's Environment Health and Safety conservation goals. UTC is aware that from a global perspective, climate change, population growth, growing energy demands and shortages of renewable fresh water supply necessitate that sustainability planning include water management best practices. From the corporate perspective, water supply and use issues have the potential to impact how and where manufacturing sites operate.

UTC has reduced GHG emissions, energy use, and water use at their plants primarily through equipment replacement and process improvements. Examples of improvements include:

- *Cooling Tower Management*—Various UTC locations have adopted cooling tower management best practices to save both energy and water. UTC's Hamilton Sundstrand has rolled out a Cooling Tower Management program offering sites guidance on proper water chemistry; variable speed drives and automatic controls. Through enhanced cooling tower management, one factory site alone was able to reduce its cooling tower water use by approximately 60,000 gallons annually.
- *Process Improvements*—A Carrier factory has modified its part cleaning operations in order to save energy and water. The cleaners used to wash parts before painting have been changed. The new cleaning agent requires less heat during pretreatment and contains fewer chemicals that mandate frequent water changes. One factory saved 100,000 gallons per year by modifying the cleaning operation.
- *Equipment Upgrades*—A Hamilton Sundstrand factory in Connecticut upgraded cafeteria kitchen dishwashers that serves about 4,000 people upgraded cafeteria kitchen dishwashers to save energy and water. The new equipment is estimated to save approximately 436,000 gallons of water per year.
- *Waste Heat Recovery*—A Sikorsky factory has implemented a project to recover as much steam condensate as possible instead of wasting the energy and water by discharging to drains. The condensate will be returned to the boiler to reduce the amount of water and energy required.

Budgets for energy and water efficiency activities vary by business unit but in most cases funding is identified in the internal capital budget planning process. Each UTC business unit has their own capital planning process. Project implementation is typically based on local priorities including progress toward sustainability goals. There is no central management over investments in energy and water conservation projects except for monitoring progress in achieving sustainability goals and reviewing the status of project implementation. UTC's corporate office reviews the status of goals and publishes a quarterly report for senior management. The status of "completed" and "pending" project lists are reviewed with business unit senior managers to encourage investments in cost-effective projects.

Program Performance

Since setting its 2006 goals UTC has identified over 1,800 energy efficiency projects, valued at $260 million, and implemented over $156 million in energy conservation and co-generation projects,

averaging $31 million annually. To date 204 of UTC's 300 global sites have completed at least one energy and or water conservation project. UTC tracks project implementation by site and project including investment costs, utility incentives and cost savings. Energy projects have resulted in an average payback of 2.5 years. Water projects often have much longer payback periods and in many cases are completed as part of other pollution prevention/conservation initiatives and therefore water savings are not documented in great detail.

By the end of 2011 UTC had successfully reduced annual water consumption by 28% compared to its 2006 baseline, from 2.1 billion gallons to 1.6 billion gallons, on track for the 40% 2015 savings target. It had already surpassed its 2015 greenhouse gas goals by reducing emissions from 2.55 to 1.85 million metric tons of CO2e by 2011, a savings of just over 27%. In 2011 UTC's total operations consumed 1,889 GWh of electricity and 9,614,332 MMBtu of thermal energy, representing savings of 20.5% and 19.9% compared to 2006. These savings have translated into documented cumulative cost savings of $55 million on energy and $700,000 on water costs as well as 221,985 metric tons Co2e avoided during the five year period. Documented savings directly attributable to specific completed efficiency investments since 2006 account for 281,480,279 kWh and 129 million gallons of the cumulative savings from 2006 through June 2012, or 18.5% of electric saving and 6.3% of water savings during that time period. New projects continue to be completed each year and new savings are achieved.

Lessons Learned

- *"Big Goals" = "Big Results"*—A major lesson learned from implementing UTC's program was that big goals would consistently translate into big savings. UTC sites were assigned aggressive energy and water conservation goals year after year. And each time projects were identified and implemented to successfully achieve the goals.
- *Leveraging trained and experienced staff*—Throughout its history, the program has challenges allocating resources and identifying/developing energy engineering talent. A corporate energy team was developed to bring together energy experts within the company to develop and share best practices. The team was able to perform energy audits on small and medium size sites that did not have energy expertise on site. The Team also created an *Energy Management Guidebook* that is used as a "How To" book by facilities engineers around the world to implement energy management best practices. A *Water Management Guidance Document* was also created to help site staff identify and prioritize water management best practices.
- *Share best practices with suppliers and peer companies*—UTC sees its experiences as transferable to other companies. The second version of the *Energy Management Guidebook* was designed specifically to share with key suppliers and to be made available publicly for use by peer companies and others. The water guidebook is currently a resource available only to UTC employees but the company hopes to also make it a resource available to other companies in a future revision.

Additional Resources

UTC Annual Report: http://2011ar.utc.com/approach_environment.htm

UTC Sustainability Goals Brochure:
http://www.utc.com/Corporate+Responsibility/Environment/2015+Sustainability+Goals and
http://www.utc.com/StaticFiles/UTC/AnnualReports/2015_Sustainability_Goals/360_EHS_FactSheet.pdf

Energy Management Guidebook:
http://www.utc.com/StaticFiles/UTC/StaticFiles/utc_energy_management_guidebook.pdf

LEAK DETECTION PILOT PROGRAM

Southern California Edison

Program at a Glance	
Location: Las Virgenes, CA; Apple Valley Ranchos, CA; Lake Arrowhead, CA	*Financial Savings and Other Program Results*: 81 metric tons of carbon dioxide avoided annually and $146,000 in annual water agency avoided costs.
Sector/Customer Segment: Water Utilities	*Budget and Funding Sources:* $300,000 spent over 18 months from electric ratepayer funds allocated by the California Public Utilities Commission
Program Start (and End) Date: July 2008 to December 2009	*Contact Person*: Gene Rodrigues Director of Energy Efficiency Gene.Rodrigues@sce.com (626) 302-0799
Annual Energy and Water Savings: 497,788 kWh and 82,923,912 gallons of potable water.	*Program Website*: http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/index.htm

Program Description

The Leak Detection Pilot program of Southern California Edison was a pilot program designed to provide assistance to water utilities in auditing their water distribution systems for leaks, recommending repairs and other interventions. The goal was for repairs resulting from the program to contribute direct water saving from reduced leakage as well as embedded energy savings from reduced electricity requirements for water supply, conveyance, treatment and distribution resulting from avoided leakage. The pilot is a good example of a water and energy utility partnership to develop a water savings program that also considers the value of saving energy embedded in water.

Research on water systems in California has determined that water-related uses account for 19% of the state's electricity consumption and 30% of its natural gas use (CEC 2005). One result of this research was a series of pilot programs to reduce water-related energy use developed by the California Public Utilities Commission (CPUC) and the four investor-owned energy utilities in the state, including Southern California Edison (SCE). The Leak Detection Pilot program was launched in 2008 as one of these nine Embedded Energy in Water Pilots established by the CPUC.

The CPUC effort program was designed to focus on cold water savings in water utility distribution systems with a primary goal of achieving savings of embedded energy through one of four methods identified by the CPUC, in docket 07-12-050, to achieve this goal:

1. Conserve water;

2. Use less energy intensive water (gravity-fed or recycling versus groundwater, aqueducts of desalination);
3. Make delivery and treatment systems more efficient; and
4. Produce more energy through water delivery and treatment.

The Leak Detection pilot primarily focused on the third of these four methods.

The water and energy relationship is of particular interest in California because of its varied climate, concentration of population in the more water-poor parts of the state, and, as a result, high energy demands and costs for water conveyance to bring water to the population centers. However, the varied climate and water systems across the state also means that the state is somewhat representative of the variation in water-related energy use around the U.S. As Table 6 shows, the variation in energy needed for water distribution in California water utilities is relatively small compared to energy demands of water supply, conveyance and treatment. As a result interventions to improve the efficiency of the water distribution system, such as the Leak Detection Pilot, may be largely transferable to a variety of other systems to achieve significant water and energy savings.

Table 6. Water and Electricity Use in California

	Range of Energy Use in California water systems (kWh/MG)		Electricity Use in *Typical* Urban Water Systems (kWh/MG)	
	Low	High	Northern California	Southern California
Water Supply and Conveyance	0	14,000	150	8,900
Water Treatment	100	16,000	100	100
Water Distribution	700	1,200	1,200	1,200
Wastewater Collection and Treatment	1,100	4,600	2,500	2,500
Wastewater Discharge	0	400	NA	NA
Recycled Water Treatment & Distribution	400	1,200	NA	NA

Source: CEC 2005

The SCE pilot program focused on the distribution segment of water utility activities through audits and repairs to three municipal water systems within the SCE services territory: Las Virgenes Municipal Water District, Apple Valley Ranchos Water Company, and Lake Arrowhead Community Services District. These water agencies were selected by SCE as partners on the pilot primarily because of their manageable sizes (with about 20,000 total service connections), which would help to make the audits easier to conduct, and because of existing relationships between SCE and the agencies. Of these

partner agencies only one, Las Virgenes, implemented any proactive leak detection practices prior to the pilot and only on a small section of its distribution network.

The pilot was budgeted $300,000 in electric ratepayer funds for use by SCE. These funds were primarily applied to the audits of the water utility distribution systems. SCE also covered the cost of program and regulatory efforts, including program design, implementation, and reporting. The partner water agencies were responsible for paying for repairs of their choosing and implementing other recommendations of the audits. They were also responsible for providing staff time for data analysis. Actual water agency investment in the project were not documented although much of was embedded in existing operational costs including staff time and repairs. Originally scheduled as a 12 month project, its implementation extended from July 2008 to December 2009 although most of the work actually happened over a 12 month period.

The three major partners in the pilot were the SCE program manager, the audit implementation contractor, and the water agency program managers. The first phase of the project—presenting the program scope at a regional meeting of water groups, identification and selection of potential partner water utilities, and establishing scope, roles, and trust at the kickoff—was directly managed by the SCE project manager. After audits began the implementation contractor, Water Systems Optimization Inc. (WSO), took over most of the direct project management activities, while still communicating regularly with the SCE project manager on a weekly conference call. WSO helped develop the project scope, developed secondary research to help develop the program and propose future directions, helped analyze and recommend candidate water agencies for partnership, conducted water audits, and led leak detection efforts and related training. The water agencies were required to provide data to WSO including customer information, water purchases, and energy usage. Agency staff members were also required to participate in field activities for the audit and leak detection efforts including turning pumps off and on and reading meters. The agencies were also responsible for repairing found leaks.

The audits were undertaken by Water Systems Optimization Inc., under contract to SCE. The audits of all three water systems used a "top down" methodology based on the protocols of the International Water Association and American Water Works Association. The audits consisted of 1) measuring total system input, 2) validating and subtracting authorized consumption, 3) validating and subtracting apparent losses (those resulting from inaccurate meter readings or data or unauthorized consumption), 4) identifying the remaining water volume by type of real losses (reported leaks, hidden leaks, or background leakage). The audits were primarily interested in identifying hidden leaks, those not in view from above ground and with moderate to large flow rates that would go likely otherwise go unrepaired. Hidden leaks were estimated through a variety of techniques including subtraction of reported, unreported, and background leaks and breaks; minimum nightlight flow analysis; weekly monitoring; and district metered area shutdown. Estimated hidden loss for each utility is included in Table 7.

Table 7. Hidden Water Loss for California Utilities

Real Loss Component (million gallons per year)	Apple Valley	Las Virgenes	Lake Arrowhead
Total Real Loss Estimate from Water Balance	344.75	342.1	39.87
—Losses from Reported Leaks and Breaks	73.89	9.1	1.76
—Losses from Unreported Leaks and Breaks	0	0	2.69
—Losses from Background Leakage	139.93	170.8	19.14
= Hidden Loss Estimate	130.93	162.2	16.28

Source: ECONorthwest 2011

Next WSO calculated the economically recoverable leakage through determining the optimal expenditures for leakage control based on the annual avoided costs to the utility from reduced water losses. This analysis estimated that 60 to 116 million gallons per year in leakage, resulting in between $69,368 and $502,380 in annual avoided costs, could be recovered cost-effectively, the equivalent of between 66% and 93% of hidden losses, depending on the utility. The required annual budget to achieve the savings ranged from $27,500 to $40,000.

Program Performance

In addition to the audits, WSO also provided field leak detection and repair trainings for each water agency including methods for sonic leak detection and calculating estimated leakage volumes. The detection campaigns that resulted surveyed for leaks in between 12% and 26% of the lengths of the distribution networks depending on the utility. Between 6 and 28 leaks were detected and repaired in each system. Leaks fixed included those in distribution mains, fittings (valves and hydrants), trunks greater than a foot in diameter, and 1-inch service lines.

Table 8 compares the water savings and embedded energy savings achieved through completed leak repairs to the total cost-effective savings available. Water savings from repairs were calculated for each leak using standardized formulas for flow rates estimated by pipe size, water pressure and other engineering variables. Embedded energy savings were determined using energy intensity values calculated for the supply, conveyance, treatment and distribution segments of utility operations from data provided on water provision volumes and energy use by each water utility.

Table 8. Water and Energy Savings, Leak Detection Pilot Program, Southern California Edison

Water and Energy Savings	Apple Valley	Las Virgenes	Lake Arrowhead	Total
Water Saved from Leak Repairs (MG/Year)	35	37	11	83
Energy Saved from Leak Repairs (kWh/Year)	76,973	355,557	65,258	497,788
Potential Water Saved from Future Repair of Hidden Leaks (MG/Year)	87	116	60	263
Potential Energy Saved from Future Repair of Hidden Leaks (kWh/Year)	193,575	1,100,519	368,527	1,662,621

Source: ECONorthwest 2011

The program also resulted in 81 metric tons of carbon dioxide avoided. And the total annual water utility avoided cost from repairs made is approximately $146,000.

In addition to the savings achieved through leak detection and repair, WSO also estimated potential water savings from changes in pressure management strategies and investments in new pumping infrastructure to allow the systems to operate with lower water pressure. These pressure management changes were cost-effective when valuing water at *retail* costs in all three systems, but were only cost-effective using *utility avoided* costs in the calculations in Lake Arrowhead because of the significant infrastructure investments required. Lake Arrowhead was the exception because of the large costs associated with importing water from another utility district and the extensive pumping required in its conveyance due to high elevation. Potential annual water savings from changes in pressure management were estimated to range from 32 to 82 million gallons. However, only a few of these pressure management changes were implemented during the course of the pilot and the savings estimates were not evaluated.

The CPUC-sponsored evaluation of the nine completed Embedded Energy in Water Pilots Programs specifically noted that the Leak Detection pilot program had the "greatest energy savings potential (at relatively low cost) among all the Pilot programs" (ECONorthwest 2011) and went on to note that this is based only on achieved savings and that potential economic savings were estimated to be much larger. It also noted that the program "warrants further consideration for inclusion in regular IOU [investor-owned utility] programs, pending further analysis of cost-effectiveness," a relatively ringing endorsement the equivalent of which was received by none of the other pilot programs (ECONorthwest 2011). This pilot successfully demonstrated that water and energy savings from leak detection and repair can be large and that cost-effective repairs can be successfully achieved through a program sponsored by an energy utility.

Although only three water agencies participated in the pilot, WSO estimated that if a similar program were to be applied elsewhere the energy and water savings could be quite large. According to their research most water utilities in California only react to reported leaks and do not make efforts to proactively detect leaks. They estimated that, annually, 0.87 million acre feet (28.35 trillion gallons) of

water is lost through distributions pipes in California alone, and that about a third of these losses can be prevented cost-effectively. Further, the water utilities that participated in the pilot had below average leakage, meaning that water and energy savings could be even larger for utilities with greater leakage (ECONorthwest 2011).

Lessons Learned

The impact evaluation (ECONorthwest 2010) and process evaluation (ECONorthwest 2011) of the program noted several features of the program that contributed to its success as well as a variety of ways in which it could be improved.

All project partners reported being satisfied with the program and all considered it a success. The SCE program manager learned a lot about water utilities and their systems. WSO staff felt they were able to complete interesting research and develop solutions to common issues while still addressing the unique characteristics of specific water agencies. Satisfaction was high among the water agencies because "they received comprehensive, detailed and credible information about their water systems, and pragmatic guidance on how to improve their system operations…All of the agencies noted that their system understanding is now strong enough that they can continue to conduct audit activities more regularly on their own" (ECONorthwest 2010).The water agencies reported good planning, clear communication and high quality work from SCE and WSO and they considered the staff to be professional, tactfully, and enjoyable to work with. Agencies also reported changes in the way systems are reviewed and changes in policies for leak detection and pressure management. One agency noted an "internal cultural shift" resulting in more willingness to address leaks and now appreciated the value that audits provide for learning about a system and opportunities for improvement.

Engaging agency staff—Heavy involvement of the SCE program manager made the program a larger priority for water agency staff and increased their comfort with the program because they had already developed trust and respect while working together prior to the pilot. Although preexisting relationships may not be possible in all cases the process evaluation recommended getting buy-in from high level water agency managers at the beginning of their agencies participation and encourage them to act as manager for the project. This will help to prevent the leak detection efforts from being marginalized as a low priority. Additionally, although relationship among the pilot partners were strong at the end, water agency staff reported early resistance to the program because they felt it has attempting to highlight out their poor performance. If possible these cultural issues of leak detection perceived as criticism should be addressed upfront to allow staff to be cooperative and receptive to the results (ECONorthwest 2010).

Data challenges—The SCE program manager reported that access, quality and timeliness of data required from the water agencies for the program were among the biggest challenges. SCE expected water utilities to have data *frequency* equivalent to energy data for consumption and flows, however some utilities still do bi-monthly billing. Staff at all three water agencies were surprised at the level of detail of the data requested and the amount of staff time needed to collect the data. The three agencies each had some data-related issues varying from small staff and older billings systems to initially unresponsive staff. The process evaluation suggests that potential data challenges be addressed in the recruitment process to avoid challenges later. Basic information on billing systems and available data

should be obtained during the participant screening process to identify and prevent any potential problems during the audit process. During recruitment program managers should clearly inform water agencies about the billing, water and energy data that will be required of them so that appropriate agency staff can plan accordingly. In general water metering and data collection needs to be improved. This is not a direct concern of the energy sector, but the water sector is making improvements on their own including with advanced metering infrastructure. These investments will make water and energy program partnerships easier.

Other improvements in program design and cost-effectiveness—several potential improvements were identified by the program's stakeholders and evaluators, as follows.

- Even though the program was still cost-effective in water systems with lower levels of leakage, using low cost screening methods will help identify water agencies with the most cost-effective savings;
    - Pre-screening prospective participants for high expected leakage (to maximize water-energy savings);
    - Targeting programs to the most energy intensive water systems (e.g., Lake Arrowhead among the agencies participating in the pilot) so that energy savings benefits and cost-effectiveness can be maximized;
- Incorporating field visits by evaluators to verify repairs to detected leaks into the evaluation process will add an additional level of certainty to the savings calculations;
- Better data collection on costs to and time required from water utilities would help to provide a broader picture of the cost-effectiveness of the program and help to give potential partners a clearer understanding of what may be required of them.
- More resources may be needed for recruitment of water agency participants, because the agencies who are the best candidates for the program, those with high levels of leakage, are less likely to have commitment to or experience with proactive leak management;
- Striking a balance between funding comprehensive audits and leak detection and repair will be important to optimize the benefits to the water agencies with cost-effectiveness concerns.

Although the pilot program was widely seen as successful, it has not yet been implemented beyond the pilot phases. SCE and other utilities in the state are awaiting further guidance from the CPUC and California Energy Commission. Most notably, the CPUC has yet to publish a rule based on the 2006-2010 embedded energy in water research that would allow utilities to claim energy savings from energy embedded in water. Currently only direct energy savings and energy locally embedded in water (e.g., within SCE's service territory, but not outside) can be counted in non-pilot programs. Although some data limitations still remain even after the series of research and pilot projects, SCE program staff hope that with the high level of interest in the water-energy nexus this issue will be resolved soon and a program similar to the pilot will be approved for SCE's program portfolio by 2015, perhaps consisting of a statewide stable of water loss control experts under contract with the energy utilities. In the near term, SCE proposed in their 2013-14 Energy Efficiency Program Funding Application to further explore the integration of water leak detection services and water-energy savings recommendations in audit reports during the 2013-14 program cycle (NRDC 2012). In the meantime, SCE is continuing to explore the water-energy connection through other programs,

notably in a project in the City of Brea through their Agricultural Retro-commissioning program focused on water leak detection. The project, focused on energy embedded through local sourcing, treatment and distribution only, is expected to produce additional data on the energy intensity of water distributed within the city, and analysis of implications for the SCE territory and California as a whole.

Additional Resources

For more program and EM&V information, see:
http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/index.htm

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Appendix 2. Promising Program Awards

GREEN HOME CERTIFICATION STANDARD

Florida Green Building Coalition (FGBC)

Program at a Glance	
Location: Florida	*Financial Savings and Other Program Results*: Enhances the profitability of resale; Enhances the affordability of operation; Increases durability of the home.
Sector/Customer Segment: Residential (Indoor and Outdoor)	*Budget and Funding Sources*: Funding comes from participation fees. Program budget in 2011 was $70,000
Program Start (and End) Date: January 2001	*Contact Person*: Suzanne Cook cooksb@nettally.com 850-894-3422
Annual Energy and Water Savings: 15% energy reduction and 20% water reduction on average, per home.	*Program Website*: http://www.floridagreenbuilding.org/homes

Program Description

Florida has been experiencing an increase in development due to population growth. Due to Florida's unique and fragile ecosystem, the new development has raised concerns that natural systems are being damaged. It was the belief of the Florida Green Building Coalition (FGBC) that a statewide green building program, providing clear and measurable criteria and marketing principles, would help protect Florida's natural environment and the public. The FGBC Green Home Certification Standard is a voluntary program that educates and guides the construction industry through a process of sustainability measures that promote energy efficiency, water conservation, improved health for building occupants, and safer, more durable structures. The program was developed to ensure a more sustainable Florida. The mission of the program is to improve Florida's "built environment" and help all Floridians who are seeking to become more responsible stewards of the environment. It was selected as "Promising" because of the low participation but the green building checklist is a comprehensive set of renovations that target both water and energy in new construction residential buildings. The program's marketing is around being "green" generally, but the program's strength is in its specific definitions.

The FGBC Green Home Certification Standard provides an interactive checklist of green building criteria which the user chooses to incorporate into their construction project. For a home to achieve certification a minimum number of points must be obtained in each of the eight categories. The FGBC Green Home Standard is applicable to single-family homes and multifamily buildings of less than three stories. It is a consensus-based certification standard developed by industry experts and

stakeholders. The certification standard has an ongoing review process to ensure integrity and applicability.

The program is administered by the Florida Green Building Coalition. The organizational budget comes from dues and program certification fees. The overall annual budget in 2011 was $300,000. The total administrator program costs in 2011 were $39,000. Program funding comes from the certification application fees and the total customer program cost for 2011 was $70,000. The application fees vary in expense depending on whether the participant is a member of the FGBC, and whether the home is a single or multifamily unit. The certification fees for home builders range from $75 to $125.

The FGBC Green Home Standard is comprised of several documents, all of which are available on the organization's website. The interactive FGBC Green Home Checklist (FGBC 2012a) outlines all of the green criteria options, point values, and submittal requirements. The Standard & Policies explains the operating principles of the certification process. The Reference Guide (FGBC 2012b) provides comprehensive information on each green criteria option, its intent, performance requirements, and additional resources for the green feature. It also serves as an educational tool on green home practices.

The FGBC Green Home Standard has a set of prerequisites that include requirements for swimming pools, spas and hot tubs, waterfront Florida yard considerations, and invasive exotic species removal. The standard includes eight categories: energy, water, lot choice, site, health, materials, disaster mitigation, and general (i.e., renewables, adaptability, small home etc.). The water category addresses indoor and outdoor conservation through selection of water-efficient products, landscaping, and irrigation.

An FGBC-accredited Green Home Certifying Agent evaluates the home by performing inspections to ensure integrity of the point awards. All project submittals also include product performance information, typically provided by a third party certification, such as WaterSense. The program is designed to ensure significant achievements in sustainability with the use of readily available products and technologies to ensure broad participation from the construction industry.

After the home has been evaluated using the checklist and reference guide, the Certifying Agent will organize a packet of all the required and suggested submittals to be sent with the application. The certification review of submitted projects is provided by a third party sub-contractor, Florida Solar Energy Center. The application package is reviewed for compliance and reviews are usually completed within two to three weeks. Upon certification, the Certifying Agent is mailed an FGBC Green Home Designation certificate for distribution to the project owner and the project is added to the FGBC online searchable database, which allows the public to verify certification.

The FGBC has an extensive outreach effort. The FGBC participates in numerous local green living expos, trade shows and conferences to broaden program participation. At the expos the staff introduces home owners to energy and water conservation programs such as Energy Star, WaterSense and Florida WaterStar, provides handout materials on ways they can conserve water in their homes,

and how important Florida Friendly landscaping practices are. The FGBC also hosts information booths at tradeshows for the building industry, city and county managers, and environmental resource agencies and they have participated in technical workgroups where local government representatives meet with program staff one-on-one to discuss ways to make their communities more sustainable. They often hold workshops for local government staff and community college facility managers on retrofitting older buildings to increase energy efficiency and water conservation.

The FGBC also does a lot of organization promotion and communications. They have a website, newsletter, and Florida Green Building magazine that helps them spotlight green certified projects and lists their green achievements. The FGBC also hosts an annual conference called the "Green Trends Conference" where they provide education sessions on all things related to green building, and water conservation.

Additionally, the FGBC administers the Florida Water Star certification program across the Florida Panhandle, covering the territories of the Northwest Florida Water Management and Suwannee River Water Management districts. Developed by the St. Johns River Water Management District, Florida Water Star is a water conservation certification program for new and existing homes and commercial developments.

Program Performance

The program is affordable and has an easy to implement process for the construction industry, it has broad acceptance and large scale impacts. The FGBC Green Home Standard is the most successful residential certification program in the state. However, the program still has opportunities to grow. The program has had 5,200 participants to date out of an estimated 7 million eligible households across Florida.

The program has estimated an average of 15% savings in electricity consumption and a 20% reduction in water use per household over code compliant buildings. However, the standard does not include an evaluation of energy and water savings so savings estimates are based on expected savings from the code check list. The program has also resulted in multiple non-energy and water benefits. For example, the FGBC Green Home Standard is a green building certification standard based on climate-specific criteria (for Florida's hot-humid environment and natural disasters), which results in buildings that perform well in the Florida environment. The FGBC also identifies a variety of less easily quantifiable benefits for the homebuyer, home builder and community (see Table 9).

Table 9. Qualitative Benefits of the FGBC Green Building Standard

Benefits to Homebuyer	Benefits to Home Builder	Benefits to Community
Enhances the profitability of resale.	Gains valuable promotion and advertising.	Conserves of water resources.
Enhances the affordability of operation.	Differentiates builder's product from the competition.	Manages of waste and storm water.
Enhances the indoor air quality of the home.	Homebuyers link green home features with quality.	Provides / maintains affordable housing.
Increases the durability of the home.	Increases customer referrals.	Maintains affordable and reliable energy sources.
Provides for greater access to mortgage money.	Adds to the market ability of homes.	
	Reduces builder callbacks.	

Source: http://www.floridagreenbuilding.org/homes

The standard is has proven cost-effective for the builders who have adopted the standard, though the program does not evaluate its cost-effectiveness. The FBGC provides measuring tools in their five green certification standards to assist building owners in calculating cost-effectiveness. The program has proved to be innovative due to its unique specification to the Florida climate. A similar standard program model can be created and adjusted to any region or state, however the specifications limit the transferability of the check list provided in the program. In addition, their marketing is around being "green" generally, but the program's strength is in its specific definitions. The FGBC certification programs help protect consumers by offering a clearly defined rating system that is consistently applied statewide.

Lessons Learned

- According to the program administrators, the biggest challenge to the program was the financial constraints of the organization. It is challenging to develop and administer a statewide program on the financial resources of a small non-profit. For example, limited resources affect the ability to collect and analyze verifiable data, which is something program planners hope to do in the future. The Florida Green Building Coalitions depends heavily on volunteers to help promote the standard Financial constraint also prevents efforts to broaden program name recognition and expand marketing efforts, including development of advertising campaigns and other public relations efforts. This challenge has been identified an

ongoing struggle; however, the FGBC has continued to increase program participation year after year through the efforts of volunteers and program participants.

- Since the start of the FGBC Green Home Standard program the organization has conducted an annual review process to ensure that the standards are based on current technologies and that they comply with the current regulatory environment. This process ensures that the standard remains up to date with the latest technologies and regulations so that it does not become obsolete. It also helps ensure that the program maintains its specification to Florida's climate.

Additional Resources

For more information on the FGBC Green Home Certification Standard, or to download the program documents, see: http://www.floridagreenbuilding.org/homes

MULTIFAMILY ENERGY AND WATER EFFICIENCY PROGRAM

City of Austin

Program at a Glance	
Location: Austin, Texas	*Financial Savings and Other Program Results:* 3.7 million metric tons of CO2 saved.
Sector/Customer Segment: Residential (Indoor and Outdoor); Crosscutting/Other	*Budget and Funding Sources:* $350,000 per annum; City of Austin water and electric revenues; and a grant from the U.S. Department of Energy's Better Buildings Neighborhood Program,
Program Start (and End) Date: October 1, 2011	*Contact Person:* Mark Jordan mark.jordan@austintexas.gov (512) 974-3901
Annual Energy and Water Savings: 6,203 kWh, 1.2 million gallons	*Program Website*: http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Commercial/Multi-Family%20Properties/index.htm

Program Description

The Multifamily Energy and Water Efficiency Program in Austin, provides multifamily facility owners with holistic water and energy efficiency evaluations, rebates and other incentives to save water and energy and their associated costs to end users. The collaboration between Austin Water Utility (AWU), Austin Energy (AE) and Texas Gas Service (TGS) (the three main utilities in this central Texas region) started as a result of a competitively awarded federal stimulus grant from the U.S. Department of Energy (DOE). The grant encouraged deep dive energy upgrades to existing buildings, including multifamily residential properties. The goal of the program is to save water and energy and their associated costs in older, multifamily residential buildings, providing benefits to building owners and renters, especially low income residents. The program is an example of a one-stop-shop approach program that works to overcome split incentives embedded in rented building spaces. In addition the program is a model of collaboration between multiple utilities effectively co-designing complementary building policies and efficiency programs.

Multifamily housing suffers from split incentives where the building owner (landlord) pays for the upgrades, while the renter utilizes the benefits from lower bills. The landlord is likely to be motivated by profit margins and since they do not reap the benefits of lower bills they are not generally driven to fund energy-saving. Similarly, renters may be unmotivated to make a capital investment in a building they do not own. By bundling incentives and providing a one-stop approach the program is able to offer more attractive packages to property owners. AE provides entry into the "one-stop-shop," manages the intake and application process, and works with third party professionals to conduct up front energy efficiency assessments. These assessments use diagnostic equipment and sophisticated

modeling software to provide owners with property-specific customized "energy reduction plans." The one-stop-shop approach benefits contractors who do the work, property owners who renovate and improve their properties, renters who receive lower utility bills, and the utility companies who are able to meet savings goals.

This program was also intended to increase compliance with the City of Austin's Energy Conservation and Disclosure (ECAD) ordinance.[2] The ECAD ordinance defines a high energy-use property as one using more than 150% of the average energy use per square foot by multifamily properties in the AE service area (ECAD 2011). The ordinance requires high energy-use multifamily properties to reduce energy use by 20%. Under the ordinance AE staff must notify the owners of high energy-use properties and within 18 months and owners must make energy-efficiency improvements to bring the property within 120% of average. If the energy reduction requirements are met and energy use is still over 150%, properties must disclose to current and prospective residents the percentage over 150% of the average electric bill that renters will pay through their monthly electric bills.

AWU, AE, and TGS each had distinct roles in running the program. AE manages the quality assurance/quality control function throughout the process, including final inspection prior to release of incentives. AE coordinates with AWU and TGS to pay rebates for installed measures. AE's Clean Energy Accelerator program uses the $10 million in seed funding from the DOE's Better Buildings Neighborhood Program to promote this whole-building approach to energy efficiency. AWU's total annual budget was $100,000 for applicable fixture distribution and rebate programs during the 2012 fiscal year.

Under the program, a facility evaluation is performed by city staff on high energy-use properties to help identify water and energy conservation opportunities and eligibility. Eligible participants must be AE electric utility customers and air-conditioned buildings with two or more residential units. A facility audit checklist was created by AWU staff for use by AE staff for energy and water facility evaluations. Once the evaluation is completed, it is reviewed jointly by utility staff to identify water and energy measures that could be implemented including the eligibility for rebates and the free distribution of efficiency fixtures. During the evaluation and after installation, AWU staff collects energy and water savings data and provides this to other utility staff, as applicable.

The technologies provided through the program includes the City's free distribution of high efficiency kitchen and bathroom aerators and showerheads, and rebates for high efficiency dish washers, clothes washers, and irrigation system upgrades. Energy efficiency measures include duct sealing, solar screen installation, CFL installation, programmable thermostats, increasing or replacing attic insulation, sealing the building envelope, insulating water heater pipes, and tuning or replacing HVAC equipment. On the water side, technologies include high-efficiency kitchen and bathroom aerators

[2] For more information on the Austin Energy Conservation Audit and Disclosure (ECAD) Ordinance, see: http://aceee.org/sector/local-policy/case-studies/austin-energy-con

and showerheads, and rebates for high efficiency dish washers and clothes washers, auxiliary water, and irrigation system upgrades.

Program Performance

As with any young program, the Austin Multifamily Energy and Water Efficiency Program will be refined and improved over time. However, it has been well received and impactful since its initiation in late 2011. As of the writing of this report the program has had 817 participants out of the 50,000 eligible customers. The is a win-win for building owners, residents, contractors, and the City of Austin allowing property owners a single point to access support from electric, water and natural gas service providers. It facilitates access to both loans and rebates capital for comprehensive energy and water related improvements. In addition, free distribution of fixtures in addition to rebates and other financial incentives have resulted in high customer satisfaction.

To date, the program has installed 249 each of showerheads, kitchen aerators, and bathroom aerators in multifamily facilities. These are estimated to save 3,400 gallons per day and over 6 million gallons during the lifetime of these devices (see Table 10 for total program savings). In addition, these devices are estimated to save 6,203 kWh a year. The program devices are well proven technologies and as a result the savings are certain to be long lasting and significant. Finally, the program is calculated to save 3.7 million metric tons of CO2.

Table 10. Energy and Water Savings for Multifamily Energy and Water Efficiency Program Devices

	AE Service Area Consumption	Multifamily Building Consumption	Program Savings
Electricity (kWh)	12,723,303,281 (billed sales) FY 2011	4,561,857,688 (all residential customers)	6,203
Water (million gallons)	52,824 pumped in FY 2011	9,478 (multifamily only)	1.2
Electricity Load Peak (Peak kWh)	—	-	0.71 kW

Source: City of Austin Multifamily Energy and Water Efficiency Program calculation

This program began in 2011 and is still burgeoning so the savings are smaller than some of the Award winners. However their innovative approach and prospect for additional futures savings awarded them a Promising Honorable Mention.

The program makes a priority of verifying that the city of Austin achieves the expected water and energy savings through testing. Austin Energy preforms pre- and post-installation inspections and surveys which verify savings. In addition, the program utilizes well documented measures and programs that have been replicated in other sectors to ensure that the installed devices are proven to reduce consumption.

The total administrative program cost was $350,000 per annum. The individual program costs have not been determined because they are contingent on the rebate activity and the program is still in an elementary stage. Since individual components (such as free fixtures) are proven to be cost-effective, the program should be cost-effective as a whole. Table 11 shows the cost of each the installed devices to the program. The devices and their installation are free to the customers.

Table 11. Cost for Multifamily Energy and Water Efficiency Program Devices

Item	Cost per unit	Total cost
Kitchen	$0.34	$84.66
Bathroom	$0.34	$84.66
Shower	$2.15	$535.35

Source: City of Austin Multifamily Energy and Water Efficiency Program calculation

The innovation of the program is the comprehensive one-stop-shop approach to provide the savings devices and the financial incentives to property owners. As a result the program is able to take advantage of the economies of scale in multifamily housing to better synchronize efforts with the energy disclosure ordinance and demographic shifts affecting the Austin market. For example one inspection identifies improvement opportunities in electric, water, and natural gas components, saving staff resource and implementation costs.

In addition, evaluation of energy and water efficiency measures together has provided better insight into the nexus between the use of both resources and overall resource protection benefits. Energy inefficient properties are likely to be older with inefficient AC units, lack of insulation, etc. These older properties are also likely to have inefficient water fixtures. The approach of the Austin Program maximizes the benefits and utilizes public money in the most efficient way. Documented measures and programs have been replicated in other sectors and can be applied to all multifamily facilities outside of the City of Austin.

These safe guards and the unique and convenient one-stop-shop set up of the program have proven to be effective and have resulted in high customer satisfaction. With the initial success of Phase 1 for residential customers, the program expanded to include multifamily facilities. The City of Austin also plans for additional expansion which will include restaurant/bars, hospitals and schools.

Lessons Learned

As a new program, the Austin Multifamily Energy and Water Efficiency Program has recently had to overcome a few hurdles. A few obstacles include: identifying the most important issues to focus on in the window of time allowed to assess and analyze each property; creating processes to report on and exchange information between utilities; and receiving approval from multiple utility company executives and legal departments. In the instance of receiving approval from multiple utilities' legal

departments, much of the process involves getting the utilities to agree to cooperate and co-promote as well as accepting centralized customer signature authority and centralized processing of financial incentives and rebates. Some of the decisions are about branding and some are related to liability, risk, and ensuring that adequate internal controls are in place.

One specific legal obstacle was related to the Austin Water Utility's previously initiated effort called the Home Efficiency Leak repair Program (HELP). HELP was meant to assist low income residents with plumbing repairs and other water efficiency measures. However, work on the AWU program was suspended due to legal prohibitions. Given this obstacle, AWU staff resources were reallocated. However, this legal barrier and lack of AWU staff resources were overcome with the recent adoption of revisions to the Water Use Management Code, Section 6-4-12(D). The revision to the code removed the legal prohibitions for those who had been officially accepted into a government assisted housing repair program. Even with the legal obstacle removed, AWU staff resources that had once been available to implement HELP were already re-allocated so the program had to leverage staff resources between the energy, water and gas utilities to fill the gap.

To address staff and resource issues, the utilities are currently to outsource weatherization, weatherization with HVAC work, final inspections, and water efficiency evaluations and repair work. They do so under a job order contract through partner agencies that can provide matching funds (i.e., the Austin Housing Repair Coalition's member agencies). So long as the organizations have the proper certification and licenses the work can be done by non-profits or plumbers. The maximum amount that can be spent on repairs and upgrades per residence is still to be finalized but it will be based on a price list being developed for the eligible work items. In addition, AWU may provide up to $250,000 annually for water related efficiency measures and AE would manage the contract and collect and report to AWU on affected customers and measures funded. With these contingencies in place the utilities should be able to outsource some of the work to other organizations which will free up staff time and fill in the gaps.

Another challenge was ensuring effective coordination between the utilities to guarantee that water and energy use data was collected before and after the efficiency measures were installed. As stated above, the program strives to verify that the City of Austin achieves the expected water and energy savings through testing and incentives. To address the coordination and data gathering challenge the utilities established a Memorandum of Understanding that specifies roles and responsibilities and designates Austin Energy as the overall program administration.

Additional Resources

For more information on the Austin Energy Multifamily Program rebates, see here: http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Commercial/Multi-Family%20Properties/index.htm

WINDSOR EFFICIENCY PAYS®

Town of Windsor

Program at a Glance	
Location: Windsor, California	*Financial Savings and Other Program Results:* 8,400,000 MBTU per year, 700 tons of eCO2 per year
Sector/Customer Segment: Residential (Indoor and Outdoor)	*Budget and Funding Sources:* Capital—Town of Windsor supplies up to $4,000,000 to pay the upfront cost for measures. Windsor is repaid with interest by the participants. Rebates—Town of Windsor has a rebate budget of up to $239,600 for turf replacement; Pacific Gas & Electric Company offers $50 per clothes washer replaced with a Tier 3 machine. If pilot goals are met PG&E's rebates will contribute up to $30,000.
Program Start (and End) Date: August 1, 2012–July 31, 2013	*Contact Person:* Paul Piazza ppiazza@Townofwindsor.com (707) 838-5357
Annual Energy and Water Savings: 540,000 kWh per year and 23 million gallons per year.	*Program Website*: http://www.ci.windsor.ca.us/index.aspx?NID=819

Program Description

The Windsor Efficiency PAYS® pilot program began in the beginning of August 2012 and was developed to achieve high customer participation in efficiency while minimizing utility costs. The program is based on the Energy Efficiency Institute, Inc.'s Pay As You Save® (PAYS®) system. The PAYS model requires financing to be repaid through energy savings from installed measures (Bell, Nadel and Hayes 2011). Windsor Efficiency PAYS® enables Windsor residents to make efficiency upgrades to their homes or apartments and replace turf with drought resistant landscaping with no up-front cost and with the immediate net benefit of lower utility bills. The pilot is designed to reach 25% of all of Windsor's residential customers in one year (2,000 participants) by eliminating all major market barriers that inhibit customers from installing resource efficiency measures that can provide them with immediate positive cash flow. The program system includes financing, tariffed repayment on the water bill, and extensive customer protections designed to remove all risks from participants for a wide range of water and energy-saving measures. It was selected as Promising because it is designed as revenue neutral with a large participation level and large planned savings.

Windsor Efficiency PAYS® allows participants to "pay as you save" with no loan and no lien associated with the payment obligation. Participating Windsor residents receive immediate utility bill savings, new water saving fixtures and appliances, such as high efficiency washing machines, toilets, showerheads and faucet aerators, drought resistant landscaping, which is one of the most important actions home owners can take to save water. Participants simply pay a surcharge on their utility bill

that is guaranteed to be lower than their estimated savings. In addition, if a resident moves or relocates at any time, their payment obligation ends. The next bill payer at that location gets the remaining savings and makes the remaining payments. If an installed measure fails at any time during the payment period and is not repaired, the payment obligation ends. Once the repayment term is complete the home owner continues to receive the benefits from the utility bill savings.

The program was designed in partnership with several organizations:

- Grantee—Sonoma County Regional Climate Protection Authority (recipient of ARRA funds through the DOE Better Buildings Program)
- Project Management—Bevilacqua Knight, Inc.
- Integration with Related Sonoma County Programs—Climate Protection Campaign
- Program Design—Energy Efficiency Institute, Inc. (EEI)
- Marketing Plan—Community Solutions Group
- Engineering Support—Resource Performance Partners, Inc.

The Windsor PAYS® Program is administered by the Town of Windsor but they also receive support from two Sonoma County agencies. The town maintains the overall program responsibility, provides the capital, and implements tariffed on-bill repayment and marketing. The Sonoma County Energy Independence Program was selected as the program's Certification Agent to provide operational program oversight including, training all contractors, providing quality assurance, handling customer inquiries, arranging repair or replacement of installed products as needed, ensuring vendors and contractors are paid bimonthly, and maintaining program database and other record-keeping. The Sonoma County Water Agency established a $250,000 loan guarantee for its water contractor, the Town of Windsor, in case there are any uncollectable payments.

The Windsor Efficiency PAYS® pilot program offers two basic packages of high efficiency upgrade measures that require no up-front costs from the customer. There is a Basic Package that includes high efficiency toilets, showerheads, and faucet aerators. Customers must install eligible measures in the Basic Package to be able to get the remaining upgrade measures. The second package is the Basic Plus option which includes high efficiency clothes washers, compact fluorescent light bulbs (CFLs), and drought-resistant landscaping. The pilot programs also offers Co-Pay measures, which requires a partial up-front payment and includes more fully featured clothes washers, high efficiency refrigerators, on-demand hot water recirculation pumps, and enhanced landscaping. The Co-Pay measures are only discussed if customers are interested in learning about them.

The program provides Windsor Efficiency PAYS® Certified Contractors who have been pre-qualified and selected to install PAYS® upgrade measures. These Certified Contractors install the measures for the residents and their work is fully bonded and insured until the participants surcharge payments are complete. The program guarantees that while the customer is paying surcharges any upgrades that do not work or were installed incorrectly will be repaired or the payment obligation ends.

The program also provides customers with a Windsor Efficiency PAYS® Certification Agent to work with Certified Contractors to ensure that the upgrade measures are installed correctly and deliver savings. The Certification Agent invites and fields all customer inquiries about the program, and

works to resolve any issues that may arise with Certified Contractors and installed upgrade measures. As explained above, Sonoma County Energy Independence Program staff will serve as Certification Agent.

The cost for the total installed measures of Windsor Efficiency PAYS upgrades are in Table 12. The table includes labor, product cost, taxes and a certification charge to pay for program oversight. The bi-monthly surcharge includes a Program Activity charge that covers Windsor's cost to provide up-front capital funding for the pilot while stabilizing water and water reclamation revenues. The surcharge is added to the water bill for 5, 10, or 15 years depending upon the measure. The table below reflects current estimates.

Table 12. Cost for the Total Installed Measure of Windsor Efficiency PAYS Upgrades

Estimated Windsor Efficiency Pays® Costs And Savings	Total Installed Measure Cost1	Copay	Bi-Monthly Surcharge	Surcharge Duration	Average Bi-Monthly Estimated Savings2	Average Bi-Monthly Estimated Net Savings2
Basic						
High-efficiency toilet, shower-head, and two (2) aerators	$334.56	$0.00	$7.78	10 years	$15.90	$8.12
Basic Plus						
High-efficiency clothes washer	$768.80	$0.00	$16.70	10 years	$22.05	$5.35
Compact fluorescent light (ea)	$5.18	$0.00	$0.20	5 years	$1.71	$1.51
Drought-resistant landscaping[3] (assumes 1,000 square feet)	$2,650.00	$0.00	$37.26	15 years[2]	$49.66	$12.40
Co-Pay[3]						
Hot water-recirculation pump	$160.00	$75.00	$3.36	5 years	$4.72	$1.36
High-efficiency refrigerator[5]	$1,301.32	$845.29	$18.06	5 years	$24.10	$6.04

Notes: [1] Reflects known program costs as of July 1, 2012.

[2] PAYS® upgrade measures have been selected to provide an estimated minimum of $1.00 in savings on your utility (water and energy) bill for every $0.75 of PAYS® surcharge. Exact savings will vary among participants and is dependent upon the accuracy of self-reporting usage estimates.

[3] Landscaping package offers savings, and so is billed, only during the summer season.

[4] These are two examples of the Co-pay measures to be offered.

[5] Assumes replaced refrigerator uses 875 kWh per year.

Source: Windsor 2012 http://www.ci.windsor.ca.us/DocumentCenter/Home/View/6025

The Windsor Efficiency PAYS program surcharge is linked to the customers water account. For every $0.75 in surcharge added to the customer's water bill, the installed measures offer an estimated $1.00 in total utility (water and energy) bill savings.

For the 2012–2013 program year the program had a rebate budget of up to $229,600 to replace turf in order to decrease peak water demand. A one-time cost of less than $40,000 is used to enhance the billing and information system. Participants pay virtually all other costs through fees. These fees cover program administration of up to $200,000 ($100 per completed residential customer) for all 2,000 participants, 25% of Windsor's residential customers. Customers will also pay for measures with an estimated total cost of approximately $2.13 million for all measures.

The Town of Windsor supplies up to $4,000,000 to pay for the upfront capital cost for measures. Participants repay Windsor through their surcharges with a 7% interest. Self-funding allows the Town of Windsor to implement the pilot with virtually no lost revenues associated with water savings.

Program Performance

The Program has been designed to develop a high volume of demand side savings for lower cost to the host utility than other programs. The program has a goal of reaching 25% of Windsor's residential customers in one year, or 2,000 participants. The program has already surpassed its program goal to attain 10% of the 2,000 participants as multifamily customers, and is still underway with single-family residential installations.

Currently, the program does not have a comprehensive assessment of the market impacts. The program has a third party evaluator that will assess the program after the pilot is well underway. According to the Windsor PAYS program, a successful pilot will demonstrate real market transformation; 25% of the utility's customers purchase water and energy efficiency measures in one year, to reduce water and gas use for participants by more than 10% and electric use by 5% or more. In addition, the Windsor Efficiency PAYS program also sells appliances and efficiency measures that are partially paid for with up-front co-payments, with the remaining balances paid by a surcharge over time. This assisted payment program increases the rate of technology uptake. All products are selected for their superior lifecycle value and customer acceptability.

In addition, a third party process evaluation, already funded by DOE's Better Buildings Program, will evaluate the program impacts at the end of 2013. However, the program is designed to collect data needed for an evaluation of the results for every customer contact. This ensures that it will be possible to determine the rate at which customers allowed contractors access to their homes and the rate at which bona fide offers (i.e., contractor offers to install eligible measures) are accepted by potential participants.

Contractors record survey data to track the following:

- Reasons why some customers allowed contractors into their homes and some did not;
- The number of homes with eligible measures, and the number of measures in each home;

- The number of customers who accepted measure offers;
- Reasons why customers reported accepting or not accepting measure offers,
- Engineering estimates of the savings by unit and cost;
- Customer charges (monthly and total) including total financing costs;
- Participant's comments and complaints;
- Ancillary measures installed for participants by program contractors (i.e., 100% of the cost paid upfront by participants and not using the surcharge).

Table 13 shows the estimated savings to date from the Windsor Efficiency PAYS® program.

Table 13. Windsor Efficiency PAYS® Program Energy and Water Savings

Metrics	Annual Consumption	Water and Energy Savings
Electricity Savings (kWh per year)	52,000,000	540,000
Non-electric Fuel (MBTU per year)	290,000	8,400,000
Water Savings (million gallons per year)	806,000,000	23
Peak Day Water Savings (million gallons per day)	-	0.09

The program also achieves some additional benefits for the town and the environment. The program, if successful, will cumulatively save 700 tons of eCO_2 per year. The program helps customers to avoid higher bills and reduce or eliminate the impact of planned rate increases because customers save money on their utility bills. It also reduces the need for expansion of water and water reclamation infrastructure, which means lower future expenses and environmental impacts. The program lowers peak summer water demand by converting turf to drought-resistant landscaping and will test the viability for Windsor to lower peak demand further by extending the program to additional residential and commercial irrigation customers at little or no program development cost.

The cost-effectiveness is intrinsic in the design of the program because this is an on-bill financing program. The Windsor Efficiency PAYS program has a total budget of $2,600,000. This entire amount will be paid by program participants through their on bill surcharge. The exception is a one-time charge of $40,000 paid by Windsor to upgrade its billing and information system and up to $239,600 for rebates for turf replacement. The one-time charge was used to create back office infrastructure to support a positive customer experience.

Offer acceptance rates by customer have ranged from 50% to more than 75% at the ten energy utilities in four states where versions of the PAYS system have been implemented.

In order to increase participation, the program design included a strategic marketing, education, and outreach campaign including the development of a brand name adaptable to other cities. The name

clearly identifies the program's scope of services, and builds credibility and interest through successful programs being implemented over time. The Windsor Efficiency PAYS® brand includes the tag line, "WATER and ENERGY Upgrades that Pay YOU to Save" and the program's key marketing message focuses on an "offer that works."

The program also began a public awareness and education campaign early on. The program outreach strategy used tools such as: utility bill stuffers, direct mail, social media, web and email, government public access channels, local press releases, community based organizations, and robo-calling. Program implementers (vendors & contractors) developed collateral marketing pieces to market their products directly to Windsor customers and the lead contractor(s) is responsible for telemarketing and door to door canvassing of potential participants as part of their bid installation fees.

Lessons Learned

An innovation that the program utilizes is a financing approach that provides the implementing municipality with an expected return on its up-front capital funding, while also mitigating the water utility's lost revenues from the program's water savings. Other innovations include Energy Efficiency Institute, Inc.'s (EEI) systems for quality control that lower the cost for marketing, initial assessments (i.e., audits), and inspections to only $100 per completed home. Finally, this pilot will test the viability of large-scale conversion from turf to climate-appropriate landscaping in a way that is economically attractive for both a water utility and its customers.

The Windsor Efficiency PAYS program is transferable across the country. An identical program can be run at any California water utility with comparable rates at little or no cost (unless the utility requires comparable billing and information system upgrades). Other utilities can hire consultants to tailor the program to their rates, weather conditions (and its impact on which measures qualify for their program), target customers (e.g., commercial or industrial), and adapt the forms and contracts to their needs.

The program faced a variety of barriers during its initial pilot phase. First, water and reclamation (wastewater) rate structures were unsuited to provide a sufficient price signal to deliver immediate savings to customers. As part of a rate study already underway during the program's design, and as recommended by EEI, Windsor agreed to change its volumetric billing to gallons instead of thousand-gallon usage increments. The town also agreed to adjusted the wastewater bill for PAYS customers immediately based on calculated savings at the time the indoor water efficiency measures were installed (i.e., instead of the normal annual adjustment that might take as long as one year to reflect savings). Additionally, a non-related water rate increase was implemented in one larger increment rather than four consecutive years of smaller increases, which ensured that the landscaping qualified as a cost-effective measure for the pilot program (i.e., the PAYS system can only qualify measures based on the rate(s) in effect when measures are installed).

Second, there were significant concerns about lost revenues. To resolve this issue the town chose to fund the project with its own capital. By doing so, the town earns a greater return on its reserve fund (i.e., almost double), while also accumulating sufficient revenues to offset lost revenues from participants' water savings. With this approach, the town's rate planner determined no rate increase

would be required due to lost revenues associated with program water savings during the scope of the analysis and that revenue erosion associated with water reclamation (sewer) required only a one-time 1.5% rate increase.

Additional Resources

For more general information about the Program see their FAQ page:
http://www.ci.windsor.ca.us/DocumentCenter/Home/View/6025

OZONE LAUNDRY PROGRAM

City of Santa Rosa Utilities

Program at a Glance	
Location: Santa Rosa, CA	*Financial Savings and Other Program Results:* 4640 tons of GHG
Sector/Customer Segment: Commercial (Indoor and Outdoor)	*Budget and Funding Sources:* Total program cost: $45,000 Annual program cost: $20,000 City of Santa Rosa Utilities Capital Improvement Project Budget
Program Start (and End) Date: January 1, 2009	*Contact Person*: Daniel Muelrath dmuelrath@srcity.org (707) 543-3988
Annual Energy and Water Savings: 575,000 kWh, 819,760 Therms, 72.9 million gallons	*Program Website*: http://ci.santa-rosa.ca.us/departments/utilities/conserve/Pages/SustainedReductionRebate.aspx

Program Description

City of Santa Rosa Ozone Laundry program is a rebate program for hotels and commercial laundry facilities. The objective of the program is to reduce water and energy use in the hotels and other commercial laundry facilities in Santa Rosa utilizing the ozone laundry technology. The program evaluates the achievable water and energy savings that can be gained from retrofitting commercial laundry systems with an ozone laundry system attachment. The city offers rebates of $200 for every 1,000 gallons of sustained monthly reduction in water use and wastewater flow that is achieved through the implementation of the ozone laundry technology.

Hotels and other commercial laundry facilities use large amounts energy, water and chemicals to sanitize loads. To reduce energy and water consumption the program utilizes ozone technology because it cuts both energy and water use and can reduce the need for detergents and chlorine bleach (CPUC 2010). Ozone is active in cold water, which allows commercial clothes washers to effectively clean fabrics without hot water, and reduces the energy consumption needed to heat the water during washing. Ozone is also used in place of detergents and other chemicals, resulting in fewer rinses after the wash cycle, dramatically reducing water needs while maintaining the same level of cleanliness. The technology therefore increases the life of linens by a factor of two through less wash time and fewer chemicals. Furthermore, the ozone molecules are consumed in the wash process creating a waste water stream that has fewer chemicals and a cooler temperature with no ozone discharged into the sewer system.

Ozone laundry systems are attachments to existing commercial clothes washers. One ozone generator can be installed on one or more washers. The installation of an ozone laundry system is coordinated

with the site's clothes washer chemical vendor to ensure the washers have the proper chemicals and appropriate settings to thoroughly wash the clothes.

This program started as part of a state-wide series of pilot studies conducted to quantify the amount of energy embedded in different uses of water. The California Public Utilities Commission (CPUC) approved the Embedded Energy in Water Pilot programs, through which California's largest energy Investor-Owned Utilities were directed to develop partnerships with water agencies, implement specific water conservation and energy efficiency programs, and measure the embedded energy savings. The CPUC required the utilities to partner with water providers to implement jointly funded programs designed to conserve water, use less energy-intensive water or make delivery and treatment systems more efficient and thereby reduce energy used by water providers and wastewater treatment agencies. The program included nine Pilot programs that are implemented by Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas and Electric Company between July 2008 and December 2009.

In the pilot phase of this program (2009-2010) Santa Rosa worked with Pacific Gas and Electric Company (PG&E) and the Bay Area Air Quality Management District (BAAQMD) to conduct a pilot water and energy conservation program. The BAAQMD provided grant funding support the program rebates and PG&E was involved to calculate energy savings and evaluate the energy savings potential. The total cost of the pilot program was $45,000, with an annual cost of $20,000. The total cost to participants was $45,000.

Program Performance

The Santa Rosa Ozone Laundry pilot program has been successful in achieving its goal getting targeted industries (hotels, laundry facilities etc.) to implement the ozone laundry technology and therefore save water and energy. The program has achieved complete market saturation of the ozone technology and all of the customers served in the program have expressed satisfaction with the technology, ease of implementation, and resulting savings. Extensive customer service is available from ozone vendors and utilities staff. The program is also serving as a guide for other communities to implement this technology successfully.

Since the end of the pilot in 2010 Santa Rosa has continued the program and received additional participation. There have received two additional installations of the ozone laundry technology in the eligible locations in Santa Rosa. With this 100% of eligible locations have adopted the technology. In addition, the commercial program has led to new rebates of residential ozone units that work for smaller commercial facilities and homeowners.

A Santa Rosa study found that the installation of ozone generators into existing commercial clothes washing systems has resulted in a 40% decrease in demand for water and a 98% reduction in natural gas consumption (therms/year). The program has achieved substantial energy and water savings (see Table 14) which have led to other benefits such as 4640 tons of greenhouse gas emissions reductions.

Table 14. Energy and Water Savings Benefits of Santa Rosa Ozone Laundry Program

	Annual Sector Consumption	Annual Program Savings
Electricity (kWh)	1,500,000	575,000
Non-electric Fuel (therms)	836,490	819,760
Water (million gallons)	210	72.9
Greenhouse Gas (tons)	N/A	4640

Energy and water savings have been consistently identified at installation locations. Each installation and study site had inline sub-meters installed on both the cold water and hot water intake for each washer. The meters are installed a minimum of 30 days prior to the installation of the ozone device and left on for a minimum of 30 days post installation. Water use is compared pre- and post-installation to determine the hot water and total water saved from the installation of the ozone attachment. The amount of natural gas (used for heating water) is evaluated by comparing the onsite gas meter pre- and post-installation. The energy savings calculations are done by evaluating both direct and indirect (embedded) savings.

The ozone laundry technology is financially beneficial for customers and Santa Rosa and it is an easy to implement program for utilities. According to the program administrator, from the customer perspective the ozone laundry technology typically has a payback period of two years or less. The water and energy savings coupled with Santa Rosa and PG&E's incentive programs often lead to a no cost implementation. The customer and the water and energy utilities have exceptional returns on investments.

The water utility evaluates cost-effectiveness on whether the cost per acre foot to conserve water is cheaper than purchasing additional water from their wholesale water agency. According to the program administrator, they currently pay approximately $700/acre foot for wholesale water, however conserving water through the use of Ozone Laundry technology only costs us $360/acre foot representing a significant cost advantage to conserving water rather than purchasing.

The ozone laundry technology is inherently transferable beyond Santa Rosa to any industry that has high volume clothes washers. The ozone systems yield a high return on investments even in markets that have lower utility rates because of the high water and energy savings. This makes the system attractive to utilities looking for cost-effective means to reducing their water and energy consumption to meet mandated targets.

The City of Santa Rosa Utilities Department utilized the relationships and the contacts established by the other pilot programs for marketing and outreach. They already had strong working relationship with targeted industries through previous water programs that Northern California has run (toilets,

urinals, pre-rinse spray valves, etc.). The program provided brochures and contacted all hotels, laundry facilities and housing facilities via phone and in person. The Santa Rosa Utilities Department also partnered with Pacific Gas & Electric as a granting agency and marketing to make sure their account representatives were aware of this program and could promote it to appropriate clients.

Lessons Learned

- The City of Santa Rosa Ozone Laundry pilot program has been an overall success; however it faced barriers related to the technology. The lack of experience with ozone technology and the program drew initial concern from other city departments. Since the project was run by the city and the city utility they needed to respond to these concerns. The utility set up meetings with multiple stakeholder and the Santa Rosa Building and Fire Departments to review the program plan and establish a process for plan review, approval, and inspection of these facilities. The departments were able to overcome the issue and now there is a standardized checklist for all new ozone projects, which has dramatically expedited the process from plan review to installation.

- This project also faced significant barriers within the first year due to the 2008 U.S. economic recession which reduced the availability of credit. The recession also caused continuing declines in customer visits in the hospitality industry, which is the target for industry for ozone laundry systems. These factors, combined with the hesitation in adopting new technology were the main barriers for those in the industry that were resistant to incurring any additional costs. Even though the technology was shown to reduce water and energy costs the industry was skeptical. However, after one initial pilot project was installed and results were validated additional sites started to participate. In addition, as the economy improved hotel and care facility participation increased rapidly.

Additional Resources

For more information on the City of Santa Rosa's Rebate Programs: http://ci.santa-rosa.ca.us/departments/utilities/conserve/Pages/SustainedReductionRebate.aspx

WATTS TO WATER

Denver Metro Building Owners and Managers Association (BOMA)

Program at a Glance	
Location: Denver Metro Area	*Financial Savings and Other Program Results:* Not measured
Sector/Customer Segment: Commercial (Indoor and Outdoor)	*Budget and Funding Sources:* $25,000 in 2011; Funded by Xcel Energy; Environmental Protection Agency Region 8; Denver Metro Building Owners and Managers Association; Downtown Denver Partnership; the City and County of Denver and Denver Water.
Program Start (and End) Date: January 1, 2009	*Contact Person*: Philip Saieg phillipsa@McKinstry.com (303) 215-4086
Annual Energy and Water Savings: 3,312,213.6 kWh and 1,129,076.1 gallons of water.	*Program Website*: http://wattstowater.org/

Program Description

Watts To Water is a metro-wide, competitive, one-stop-shop program based in Denver, Colorado that is dedicated to reducing energy and water consumption. The goal of the Watts To Water program is to create a more sustainable built environment in the Denver metropolitan area. By using ENERGY STAR Portfolio Manager as a benchmarking tool, the Watts To Water partners help properties reduce energy and water consumption rates by offering program participants free educational sessions, technical support and rebate programs. Watts To Water teaches office and hotel property managers how to be more environmentally and economically sustainable. The program was selected as "Promising" because it was able to harness a significant amount of funding targeted at a historically difficult market with large potential savings and is an example of strong partnerships.

The Watts To Water program targets energy and water efficiency upgrades as it at hotels or commercial office buildings over 5,000 square feet. Some of the technologies addressed are lighting, HVAC, plug loads, faucet fixtures, toilets, showers, and domestic hot water. Participating buildings use the ENERGY STAR Portfolio Manager tool to share energy and water use with the Watts To Water program. The ENERGY STAR Portfolio Manager is an interactive energy management tool that allows users to track and assess energy and water consumption across their entire building portfolio online.

All participating properties that share data and register for the program receive the following benefits:

- Complimentary technical support from ENERGY STAR technicians;

- No cost online review of benchmarking data;
- Recognition in Denver-area publications and on the Watts To Water website;
- Unbiased ranking of their building's energy efficiency with a private report detailing overall market ranking;
- Free educational programs on how to reduce consumption, engage tenants, get a positive return on investment for capital improvements and more; and
- Access to rebates and other programs to lower the costs of adjusting building operations and/or materials.

Rebates are available to participants with commercial buildings over 50,000 square feet through Xcel Energy's Commercial Real Estate program. In 2012 $60,000 in city rebates were available to Watts To Water participants. Rebates are available for exterior lighting and motion sensors (including parking garage lightings), not to exceed $5,000 per business. These rebates were based on energy savings and subject to the program staff's review and approval. Rebates are contingent on energy savings, subject to the program staff's review and approval and are offered on a first come first served basis. Additionally, tenants, if separately metered, can take advantage of the Small Business Energy program rebates.

The Watts To Water awards acknowledge office and hotel buildings over 5,000 square feet that have reduced their energy and water consumption between January 2010 and December 2011. A benchmark year is set (the year is 2008 for this inaugural round) and a subsequent year's data is compared against the benchmark year to determine which properties will be awarded recognition in three different categories. Participants are only eligible if they share their water and energy data in ENERGYSTAR Portfolio Manager. The award categories are as follows:

MOST EFFICIENT BUILDING Hotel and office buildings are awarded in separate categories. The awards jury will calculate a weighted average of the water performance and ENERGY STAR ratings to determine the building that wins this category. The award will be presented to the office and hotel buildings that demonstrate the best water performance (indoor and outdoor) per square foot and the highest ENERGY STAR rating.

GREATEST IMPROVEMENT IN EFFICIENCY Hotel and office buildings are awarded in separate categories. The awards jury calculates a weighted average of the water and energy consumption to determine the building that wins this category. The building that has had the greatest improvement from the previous year to the current will be awarded. The award will be presented to the office and hotel building that demonstrates the greatest water and energy reduction per square foot.

VISIONARY AWARD This is awarded to one building based on a submitted "success story" that demonstrates how the program improved energy efficiency and/or reduced water consumption. The awards jury choses the building that has most successfully implemented energy and/or water management strategies, behavioral solutions and capital improvements. Stories are shared and highlighted on the Watts To Water website.

SUPER SAVER CERTIFICATES This is awarded to all buildings that meet the following criteria: reduces indoor water use by 50% or more; reduces outdoor water use by 35% or more; have both indoor and outdoor meters and reduces overall water use by 60% or more; and reduce kWh by 10% or more.

XCEL ENERGY AWARDS Is awarded to buildings that participate in Xcel's rebate program. The award is given for the highest peak reduction as a rebate program participant, the highest usage reduction through any single rebate program, and the highest usage reduction through multiple rebate programs.

The program partners with Xcel Energy, Environmental Protection Agency Region 8, Denver MetroBuiling Owners and Managers Association, Downtown Denver Partnership, the City and County of Denver and Denver Water, all of who provide funding. The organizations that administer the program include: Denver Metro Building Owners and Managers Association, The City and County of Denver, and the Downtown Denver Partnership have run this program as an equal partnership with strong support from the local utilities (Xcel Energy, Denver Water) and the EPA Region 8. The overall program cost in 2011 was $25,000. The average cost to the program per customer is about $135 including all overhead, events, admin, etc. spread across customers.

Program Performance

The Watts To Water program has stimulated the Denver commercial real estate market to implement energy and water savings in several different ways. This has helped generate business for energy performance contractors, commissioning, equipment replacement, water fixture replacement, energy audits, LEED certifications, to name a few. The Watts To Water program is extremely cost-effective because it is almost entirely volunteer run, and is of no cost to the participants.

Through providing benchmarking assistance and a setting for commercial real estate to compete over energy and water savings, the Watts To Water program has reached nearly thirty million square feet of commercial real estate. Out of the thousands of eligible customers Watts To Water has had 142 participants.

The participants in the Watts To Water Program have resulted in substantial energy and water savings (see Table 15).

Table 15. Watts To Water Program Energy and Water Savings

	Denver Commercial Building Consumption	Program Savings
Electricity Consumption (kWh)	77,000,000,000[1]	3,312,214
Water (gallons)	14,663,295,000[2]	1,129,076

Source: Program savings data was provided by Watts To Water .

[1] Total Electricity Consumption and Expenditures for Non-Mall Buildings (2003). Building Floorspace (Square Feet) of 5,001 to 10,000 http://www.eia.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set10/2003pdf/c13.pdf

[2] "Denver Water serves more than 1.3 million customers in the Denver metro area. Its customers use more than 225,000 acre feet of water each year, 20% of which is used by the commercial sector." http://www.naiop-colorado.org/ResourceSmart.aspx

Watts To Water continually has building owners and managers signing up. According to the program contacts, they have not received any complaints by the owners on their interactions with Watts To Water . The EPA's well-trained staff does most of Watts To Water 's customer interface, including helping customers correctly enter their buildings' data into Portfolio Manager.

Watts To Water utilizes a collaborative outreach strategy. BOMA, as the administrator of this program, promotes Watts To Water as one if its programs in all its local events and organizational happenings. In addition, the program partners with a number of key organizations in the Denver greater area that are able to leverage constituencies for the program. Watts To Water also partners with the City and County of Denver, the local business improvement district (BID), the Downtown Denver Partnership, Xcel Energy, Denver Water, Colorado University, and the Colorado Energy Office. The program helps create a culture of efficiency within the greater Denver Metro area commercial environment by hosting education events, an annual awards ceremony, plaques hung in the lobbies of densely populated buildings, and direct involvement of the city's Mayor who personally signs the awards to competition winners.

Lessons Learned

- Though it was modeled after the "kilowatt-crackdown" BOMA program in the Pacific Northwest, this program is the first of its kind to include water efficiency. The success of the program has spurred expansion efforts to multifamily and medical buildings in 2013.

- This program is transferable to any mid-sized to major city across the United States. All the partners that put the program together in Denver exist in bigger cities across the United States, such as a local BOMA association, city government, local utilities, and a business improvement district or downtown partnership. The program also does not require extensive funding.

- The largest barriers to the program included getting people "on board" was education and correct data entry. Instructing program administers though the ENERGY STAR Portfolio Manager can be time consuming and often programs will incorrectly input data, leave gaps, or misunderstand their water meters. Watts To Water Administrators and EPA staff spend a lot time helping program staff input data and troubleshoot.

- Another common barrier is fundraising for the program. The program was initially seed-funded by the EPA and supported by a number of sponsors, but to grow the program into new sectors (multifamily, healthcare MOBs—which is planned for 2013) additional funding is required.

Additional Resources

For more information on the EPA Portfolio Manager:
http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

For general information about the Watts To Water Program: http://wattstowater.org/

For information on the BOMA "kilowatt-crackdown" challenge see here:
http://www.bomampls.org/boma/kwcd/kilowattcrackdown.aspx

SAVE WATER–SAVE ENERGY AGRICULTURAL ENERGY EFFICIENCY PROGRAM

Bonneville Power Administration (BPA)

Program at a Glance	
Location: Washington, Oregon, Idaho, western Montana and Wyoming, and the northern California, Nevada and Utah	*Financial Savings and Other Program Results:* None reported at this time.
Sector/Customer Segment: Agriculture	*Budget and Funding Sources*: 2012 Program Year budget is $1.28 million. Funding is received from customers and the rest is cost sharing between BPA and the RC&Ds
Program Start (and End) Date: April 27, 2011	*Contact Person*: Jennifer Eskil jleskil@bpa.gov (509) 527-6232
Annual Energy and Water Savings: Between 17-20 aMW. Water production and/or consumption data is not tracked as part of the program.	*Program Website*: http://www.savewatersaveenergy.org

Program Description

The Bonneville Power Administration (BPA), the three state-level Resource Conservation and Development (RC&D) Councils and the Northwest public utilities together established the Save Water–Save Energy Agricultural Energy Efficiency program. The program works to assist the utilities in offering more extensive and effective irrigation and agriculture water and energy efficiency programs. The Save Water-Save Energy collaborative approach develops and enhances partner support and helps keep the overall program costs low. The goal of the program is to increase the adoption of water and energy-saving measures in the agricultural sector. The program markets cost-effective agriculture efficiency measures and provides the necessary "boots on the ground" to assist agriculture producers with project development to qualify for financial incentives. The results of the collaboration have included electric energy savings as well as non-energy benefits such as increased irrigation uniformity, reduction in overall cost, decreased water and fertilizer application, and proven increased crop yields. It was selected as a Promising Program because it is an excellent example of multi-organization partnerships with a comprehensive set of agriculture processes. The program is also recognized for its strong funding commitments, focus on water quality and dedication to providing their customers with extensive assistance to achieve the most savings.

The Save Water–Save Energy program was developed after BPA attended a state program presentation by the U.S. Department of Agriculture (USDA) on the 9006 Farm Bill. BPA discerned that there were several agencies and organizations working with the same farmers and irrigators trying to implement similar programs. To help streamline and coordinate the efforts, an ad hoc group was formed which included BPA, USDA Rural Development, Natural Resources Conservation Service

(NRCS), Energy Trust of Oregon, Oregon State University, and a few non-profit support organizations. After over two years with limited progress, BPA developed and entered into a pilot program agreement with Wyoming East RC&D and Cascade Pacific RC&D in order to test the cooperative agreement approach within a limited area. The test pilot was successful and showed the potential for developing it into a larger statewide approach.

The result was the current Save Water–Save Energy program which stream lines RC&D efforts, and allows public power utilities to more easily partner with local RC&D councils to increase energy savings in their territory as it aligns with their goals and strategies. RC&D Councils are local, non-profit conservation collaborations, working with conservation districts and other partners to bring Save Water–Save Energy program services to their local communities. BPA state level RC&D Council partners include: Cascade Pacific RC&D Council in Oregon, South Central WA RC&D Council in Washington, and High Country RC&D (HCRCD), which is made up of a joint agreement between Idaho, Montana, and Wyoming States. These three RC&D Councils take the lead in directing and managing the other RC&D Council's working in their respected service areas to assist agriculture producers to find and develop qualifying, cost-effective agricultural projects that will result in electric energy savings.

The Save Water–Save Energy program BPA and the RC&D Councils work to assist the public utilities and Rural Electric Cooperatives in meeting any energy efficiency targets and goals, and provide a platform for RC&Ds and Soil and Water Conservation Districts in delivering a valuable service. The program helps utilities meet their goals while insuring that BPA provides the least cost and most reliable electric power to the Pacific Northwest.

Through the Save Water–Save Energy program BPA and the RC&D Councils helps local farming communities gain greater access to energy efficiency technology. The program provides a one-stop shop to connect agriculture operators and owners with efficiency opportunities. The RC&D Council's leverages the services of the US Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) and the expertise from regional Soil and Water Conservation Districts and water conservancies. Energy analysts also assist agriculture producers and rural small businesses to reduce on-farm energy costs as well as find funding for energy improvement projects. The services may include arranging and/or performing onsite energy assessments, identifying energy efficiency measures, establishing funding eligibility, estimating energy costs, developing draft projects, and submitting them to participating utilities to submit to BPA.

The Save Energy-Save Water program helps local famers obtain energy efficient irrigation system upgrades and equipment as part of their service. The following technologies represent some, not all, of the technological opportunities that the program helps farmers identify and obtain:

1. Sprinklers, nozzles, gaskets, and drop tubes;
2. Variable frequency drives (VFD);
3. Freeze-resistant stock water tanks and fountains;
4. Electrical system transformer de-energization, on-farm lighting;
5. Scientific Irrigation Scheduling (SIS), also known as Irrigation Water Management (IWM).

Variable Frequency Drives (VFDs) can control the startup and operational characteristics of a motor or pump/motor combination and are proven to substantially reduce energy use. In an effort to streamline the custom proposal process, BPA recently simplified installation of VFDs in spud and onion sheds. This effort removes the requirement for measurement and verification. BPA also has rebates for turbine pumping applications (BPA 2012).

SIS is a process that agriculture producers can use to improve irrigation water management. When used properly, scientific irrigation scheduling provides information on when to irrigate, how much water to apply, and how to apply water to satisfy crop water requirements and avoid plant moisture stress. When used appropriately, irrigation scheduling saves water, energy, labor, and fertilizer, and in many cases improves crop yields and crop quality (BPA 2011). SIS uses soil moisture monitoring equipment and computer modeling to schedule crop irrigation. The over irrigation or under irrigation of crops can lead to reduced crop output and overuse of water and therefore energy to pump additional water. It also can cause the leaching of nutrients and fertilizer from the soil causing the farm to apply much more fertilizer than necessary (Ley 2005). Scientific irrigation scheduling is beneficial to agricultural irrigation systems because of its high pumping capacity and ability to meet the needs of the crops.

The total program budget for 2012 was $1.28 million, which includes BPA cost-sharing for full-time equivalent[3] (FTE) with RC&Ds and BPA supported utility incentive funding and other cost-sharing and matching. The cost-sharing and matching comes from the following organizations: Natural Resources Conservation Service (NRCS), Rural Energy for America Program (REAP), Environmental Quality Incentives Program (EQIP), United States Department of Agriculture (USDA) and the United States Bureau of Reclamation (USBR). The cost for the incentives included in the program totaled $484,000 and delivery costs included $1,281,000, totally the incentives and delivery costs at $1,765,000. The expense to the customers is between $150,000 and $200,000.

As stated above, the program it targeted in the west coast agriculture sector. The total estimated agricultural load within the program area is over 500 MWs (more than 350 MWs of public served utility load and 150 MWs of federal irrigation district load). The agricultural energy load in the BPA service territory is approximately 246 average megawatts. In its Sixth Power Plan, the Northwest Power and Conservation Council estimates that approximately 876,000,000 kWh of savings exist in the agricultural sector (NW Council 2010). The annual water consumption data is not available. Below we will discuss the amount of energy and water savings that have been achieved by the program.

[3] Full-time equivalent (FTE) is a unit that indicates the workload of an employed person (or student) in a way that makes workloads comparable across various contexts. An FTE of 1.0 means that the person is equivalent to a full-time worker, while an FTE of 0.5 signals that the worker is only half-time.

Program Performance

The BPA program is a turnkey regionally collaborative approach to implementing energy efficiency savings. The program combines funding incentives, project identification, man-power (FTE) assistance, and technical support and outreach with utility customers and state levels RC&D's, bringing energy efficiency savings, incentives and opportunities directly to the end users. This increased turnkey focus has yielded significant gains in savings acquisition and has created a robust pipeline of future projects.

The Northwest Power and Conservation Council is a regional organization that develops and maintains a regional power plan that will guarantee adequate and reliable energy at the lowest economic and environmental cost to the Northwest. In the 6th Northwest Conservation and Electric Power Plan the irrigation and agriculture targeted saving is 35,040,000 kWh per year. Utilizing the support and resources of the RC&Ds to assist utilities developing irrigation and agriculture projects should result in at least a 50% increase in activity and savings. Save Water–Save Energy Program efforts have resulted in energy savings of about 2,960,000 kWhs from 40 participating utilities across state levels. The current estimated savings from projects that are being planned is 11,920,994 kWhs. These projects include expanding the program into new service areas within the lower Snake River region of Idaho and the Wells Electric Cooperative service area in Northern Nevada and Northern California. These savings do not include embedded savings and water savings are not calculated by the program.

A positive outcome of the Save Water–Save Energy Program is the increased awareness and staffing that brings energy efficiency savings and incentives directly to end-users. The boots on the ground efforts from the program have led to outreach to over 500 farms. From that outreach the program has the competition of around 235 projects with another 250 projects in pipeline as of the writing of this report. These projects have been well received by the customers. The program provided anonymous responses from their customer evaluations:

> "In areas with no irrigation efficiency programs, i.e., no irrigation districts, the agriculture irrigators rely on this program to help improve their systems. This program helps to incur savings and keep our local and regional farms in production."
>
> "Through outreach to growers and conservation districts we have found that their awareness is often limited with what their local utility offers and vice versa. This program is bridging the gap...as it has been designed to do."

The primary successful element of the BPA Save Water–Save Energy agriculture efficiency program is its collaborative approach in promoting energy efficiency. This program helps get more efficient agriculture technology to the farmers quicker and helps educate them on proper use of the technologies. Rebates for irrigation hardware and water management programs have existed for many years but, through the collaborative approach, the agriculture market is directly impacted by the increased FTE, educational outreach, energy conservation and water efficiencies. Without the hands-on one-stop-shop nature of the program, many agriculture efficiency opportunities may otherwise get missed.

The joint nature of the BPA's energy efficiency incentive efforts combined with the RC&D Councils efforts have resulted in increased projects and energy conservation. In addition, the RC&Ds have gained increased knowledge of energy efficiency opportunities and technologies by working with BPA, local utilities and other trade allies. Lastly, the program has built a bridge between agriculture producers, utilities and conservation districts, creating results driven, cost-effective and innovative approach.

The BPA has not done an evaluation or analysis of the program costs or benefits cost ration however, they provided some planning estimates. Their cost-effectiveness analysis is completed on 2 levels. First, they calculate measure by measure cost-effectiveness for every deemed measure that is used in the RC&D program based on the Total Resource Cost (TRC) test. BPA then sets the incentive levels based on the average costs that they decide to pay. Typically, they try to keep costs under $0.20/kWh and for the agriculture measures; the costs are on average $0.17/kWh.

Once the costs of the measures are calculated BPA adds in the program overhead costs, which are the costs of the RC&D program. The overhead costs affect the cost-effectiveness of the program (not the individual measures we implement and the TRC ratio), and impact the overall average costs that BPA budgets. BPA estimated that the RC&D overhead costs would add about $0.03-0.05/kWh to the total costs to acquire the measures. In total the cost of the program is approximately $0.21/kWh.

Until the creation of the Save Water–Save Energy Program there were a variety of barriers for agricultural producers in adopting more efficient technologies and measures and there were barriers to the utilities and BPA in reaching the agriculture producers. For the agriculture producers the key barriers to implementing water and energy efficiency programs included: lack of awareness of utility/regional programs, rebates, and incentives; lack of awareness of qualifying energy efficiency measures that not only save electric energy but have the potential to also bring multiple non-energy benefits; and a limited budget. To solve this barrier the program developed the Save Water–Save Energy consolidated information (one-stop shop) website. Agriculture producers and trade allies are now able to go and learn more about the different regional offerings all from one place: http://www.savewatersaveenergy.org. In addition, the program uses the utilities and RC&D staff to provide education and outreach to agriculture producers. Staff gets the word out by attending tradeshows, agriculture workshops, and regional meetings as well as creating targeted marketing materials. In addition, the leverage the relationships amongst the agricultural sector: BPA/Utility agriculture program offerings, RC&D staff, agriculture trade allies and other Federal agencies.

For the Northwest utilities key barriers included: Conservation budgets; BPA changed to a tiered rate methodology; and Limited staffing to assist and support their agriculture producers. The key barriers for BPA included limited staff and budget. In order to overcome these barriers the program utilizes available funding through utility incentives, rebates, low-interest loans, federal grants and even applicable tax credits. Combining support from the multiple agencies increases the number of staff in the field to help utilities and growers gain access to programs.

There is a large amount of potential to replicate the Save Water–Save Energy Program because RC&D Councils are located in all 50 states and there are over 2.2 million farms across the United States.

Leveraging the RC&D relationships and resources is one of the most important components of the Save Water–Save Energy Program because it extends the outreach of the available incentives. Combining all available rebates and incentives for agriculture producers from utility-based conservation measures, federal grants and tax credits results in greater uptake of these opportunities and therefore, increased energy and water savings. The RC&D Councils are in a unique position to effectively communicate implement, and foster trust with agriculture producers. Many of the farmers and irrigators sit on the RC&D boards alongside local executives and other community servants. By utilizing the RC&Ds and their government counterpart, the NRCS, BPA's Agriculture Efficiency Program provides utilities with on-farm expertise and FTE. This strategy of utilizing existing relationships between RC&Ds and farmers can be implemented across the country.

Lessons Learned

BPA's agriculture efficiency Save Water–Save Energy program is a full service program that unites agriculture producers with the available rebates and incentives, provides an extended outreach of staff and additional energy savings for utilities. The program also provides RC&D Councils with needed staffing, education and marketing and outreach tools. By providing staff support and utilizing the local and regional relationships the program is able (agriculture producers, utilities, BPA and the RC&D Councils) while increasing conservation efforts in agricultural production. Most importantly, energy savings and water conservation go hand in hand and benefits everyone.

The first challenge that BPA faced was that, after developing and presenting the program (based on the success of the pilot program), BPA's Vice President for Energy Efficiency wanted to expand the program to the entire region. As a result they had to expand the pilot into a regional program that included all or portions of our seven western states, focusing on Oregon, Washington, and Idaho. Though this was a challenge that the administrators had to overcome, it is an excellent sign of the progress they have been able to make and the success of the program.

At the beginning of program implementation, funding loss, restructuring, and closure of state level NRCS offices occurred in the Washington and Idaho territories. This has caused some programmatic delays due to the time needed to redevelop and offset the lost manpower for outreach and restoration of the funding opportunities. The loss of program support and funding saw the demise of all of the targeted RC&D Coordinators. Not to be deterred, the RC&D Program worked through the loss of the USDA support and helped the surviving RC&Ds put together a workable program and restructure.

After the RC&Ds restructure there was a renewed focus on building the Save Water–Save Energy program and significantly deliver support to utilities and irrigators. In many cases, the Save Water–Save Energy program became the primary energy efficiency program in the areas where the RC&Ds hard to restructure. In the stronger RC&Ds, Save Water–Save Energy is a portion of the efficiency support the region. The program is now seeing the NRCS start to reenter the picture and is working to develop a formal partnership with BPA and the Save Water–Save Energy program. This effort will hopefully renew the original purpose and goal of this program as a collaborative regional partnership that enhances agricultural energy efficiency savings within the Pacific Northwest.

Additional Resources

For more general information on the Save Water–Save Energy Program, see their website: http://www.agenergynw.org/home/agy/cpage_7/home.html

For information on the incentives and energy efficiency opportunities available through BPA see here: http://www.bpa.gov/Energy/N/

The following video shows a successful implementation of energy and water savings with a variable frequency drive from an agriculture producer that utilized the Save Water–Save Energy Program. http://www.youtube.com/watch?v=dFi0sjsa8q4&feature=player_embedded

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Appendix 3. Sustained Achievement Award

LIVINGWISE

Resource Action Programs

Program at a Glance	
Location: 32 States (Arkansas, Arizona, California, Colorado, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Michigan, Mississippi, Nebraska, Nevada, New Jersey, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, Utah, Virginia, Washington, Wisconsin, Wyoming)	*Financial Savings and Other Program Results:* 203,830 mBtu of non-electric fuel savings; peak load saving of 33,218 KW.
Sector/Customer Segment: Residential (Indoor and Outdoor)	*Budget and Funding Sources*: Funding comes from utility clients and/or their partners and are specific to the state where the program is administered. The budget for the Southern California LivingWise Program for one year was $2 million. The average cost per participant is approximately $40 paid for by the utility
Program Start (and End) Date: LivingWise was established in 1994 but the Southern California LivingWise Program September 1, 2008–December 31, 2012	*Contact Person*: David Grider dgrider@resourceaction.com (888) 438-9473
Annual Energy and Water Savings: 19,391,900 kWh; 833 gallons	*Program Website*: http://www.getwise.org/

Program Description

The LivingWise Program from Resource Action Programs (RAP) is a nearly 20-year-old residential energy and water efficiency education program that partners electric and water utilities together to generate immediate savings in home energy and water use. The LivingWise Program is a school-based format which includes take-home LivingWise Kits of efficiency measures along with classroom and in-home education. The goal of the Program is to create awareness for families to adopt new resource usage habits to reduce energy and water consumption in a cost-effective manner. The program has received the Sustained Achievement Award for its longevity and its proven savings.

The LivingWise Program is a "turnkey" program with little or no human resources needed from the utility. RAP handles the program from concept to completion. A Program Manager and project team implements the program at the Program Center located in Northern Nevada. Utility compliance

personnel monitor results and provide reporting to all clients on the cost-effectiveness and results of the program. The program provides participants with kits which include tools needed for auditing and retrofitting homes. The LivingWise kit includes new lightning technology (standard and specialty), high-efficiency water devices (showerheads and faucet aerators) and other measures (Filter Tone Alarm, digital thermometer, etc.) that families and households can install to help them reduce energy and water consumption.

The mission of RAP is to educate people about conservation and environmental responsibility, focusing on energy, water, and recycling. The first Measure-Based Education programs by RAP were launched in 1993 using a school delivered model. These programs combined the two prevailing program types of that time; technology-based programs (e.g.: hanging measures on doorknobs), and education-based programs, which simply distributed brochures or tips on how to save energy. RAP combined the program types in hopes that participants would learned more effectively and utilize their knowledge in their homes. RAP oversees and implements nearly 200 projects every year.

The LivingWise Program is implemented in 32 states across the U.S.: Arkansas, Arizona, California, Colorado, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Michigan, Mississippi, Nebraska, Nevada, New Jersey, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming.

RAP works in partnership with their client, usually a utility, to determine the program plan. The plans consist of the service level scorecard (i.e., an agreement that lays out the key performance indicators), communications between the client and RAP, a delivery and implementation strategy, branding and marketing of the program, roles and responsibilities, and reporting requirements. RAP also works with the client to determine the target areas for outreach and program participation along with the geographic and demographic characteristics of the targeted area. Once the area is defined target schools are identified and they list is sent to the utility for approval.

Next, RAP makes contact with the schools in the established target list. Once basic information on the school is confirmed teachers are contacted directly to get accurate information on student enrollment in the target grade level. RAP then works to enroll teachers in the program and then the educational materials are sent. Each participating teacher receives a set of Teacher Materials and a LivingWise Kit. Every student in the participating/enrolled class receives a LivingWise Kit and a set of Student Materials. Students are presented with the materials and the kits in the classroom setting and then take the kits and materials home to share with their families.

The LivingWise Program was developed for utilities to achieve savings that can be claimed under their regulatory structure. The data collection and reporting allows many utilities to use this program to satisfy their state's PUC requirements for energy efficiency. In addition to implementation, RAP preforms assessments and reporting for its LivingWise Programs. The method of assessment varies based on the requirements of the utility as laid out in the initial program planning process. RAP then provides a report that summarizes the program participation, installation rates, audit data collected, resource savings projections, and any other data desired by the utility and identified in the Program Plan.

Budgets for the LivingWise Program vary per utility client. For example, the budget for the Southern California LivingWise Program was $2 million for the 2011-2012 school year. All funding for LivingWise Programs come from utility clients and/or their partners. For the Southern California LivingWise Program, sources of funding include: Southern California Edison, Southern California Gas, Burbank Water and Power, City of Glendale, City of Azusa, Golden State Water, California American Water, California Water Service, SCPPA, Mission Springs Water District, Casitas Municipal Water District, Indian Wells Valley Water District, City of Downey, City of Torrance, and several other local government entities. The Southern California LivingWise Program had a total cost of $7,374,600 with no direct cost to the program participants. The average cost per participating household was $40 for the program as a whole.

Program Performance

The LivingWise program has reported energy and water savings that are a direct result of the program implementation. RAP reports that, on average nation-wide, each family participating in the LivingWise Program saves over 9,000 gallons of water on average, 330 kWh of electricity, and 40 therms of gas annually. These savings are achieved the participant's home retrofits utilizing the devices provided as part of the Program Kits. Over the life of the devices, each household could save up to 90,000 gallons of water, 3,100 kWh of electricity, and 400 therms of gas (RAP 2010).

All savings data is specific to the Southern California LivingWise Program because it was identified by RAP as a leading example of the cost and savings that a LivingWise Program can achieve. The Southern California Program began September 1, 2008 and is scheduled to end on December 31, 2012. The program was also selected because it is a co-sponsored program (i.e., where RAP worked with the utility to directly implement the program rather than simply providing them with the materials) to a greater extent than some programs in other states. Not all states that RAP works in run co-sponsored programs, often utilities will chose to administer the program on their own with limited support from RAP.

Deemed savings have been provided by Southern California Gas at 11.99 therms per kit, and by Southern California Edison at 114.07 kWh per kit and 0.1954 Peak kW per kit. RAP provided an average household size of the participants in the Southern California Program area to be 5.13 people with an average of 2.18 bathrooms per home. The majority of the program assumptions were provided by data from program participants or product manufacturers. The program only measures direct savings information collection in calculating the energy savings.

The Southern California LivingWise program was implemented in the Los Angeles County. There are approximately 300,000 eligible customer households in the designated program area for the Southern California LivingWise Program. Of that, 170,000 households have participated as of the writing of this report. The Southern California program has also achieved 13,372 metric tons of carbon dioxide emissions savings. Table 16 shows the savings that have been achieved to date by the Southern California LivingWise Program.

Table 16. Energy and Water Savings for the LivingWise Southern California Program

	LA County Sector Consumption(2010)	Program Savings
Electricity (million kWh)	28,531	19.39
Energy (million therms)	2,541	-
Peak Electricity Load (Peak kWh)	-	33,218
Water (million Gallons)	4,700	833

LivingWise Programs are designed to be cost-effective for the partnered utilities. The LivingWise Program uses the Total Resource Cost Test (TRC) to assess the cost-effectiveness of their programs. The LivingWise Program is evaluated with a benefit-cost ratio (BCRTRC), and all of the programs are designed to have a TRC value of greater than one. In order to ensure cost-effectiveness, LivingWise staff analyzes each state's Technical Reference Manual (TRM) and determine the best mix of measures and the method for tracking results. Therefore, the program is able to remain cost-effective even when clients' budgets' demand and PUC requirements are under a great deal of pressure.

Teacher and student acceptance is strong because the kits attracted students and proved to be an effective tool to make learning relevant and lasting while also bringing parents into the education process. RAP has programs that target water, energy, and other resource topics while incorporating activities that are correlated to state and national education standards in a wide variety of subjects. The LivingWise Program has been refined since 1994 and the basic content and activities have been updated so that the program remains relevant, up to date, and increasingly effective. Additionally, the LivingWise Program is constantly reviewed and updated using feedback from the Teacher Advisory Boards across the country.

Effectiveness of the program is measured through a pre/post-test and participant surveys. Sponsors receive a Program Summary Report detailing student's installations, experiences, home audit information and program satisfaction. The LivingWise Program constantly receives more than 90% satisfaction rates with participants. Teachers using the Southern California LivingWise Program rate the program as good or excellent by more than 90%. Nearly all participating teachers say they would do the program again if given the chance. Parents are provided with a self-addressed, postage paid "Parent/Guardian Comment Card." This card gives parents/guardians the opportunity to provide feedback on the program. Parent feedback is also generally positive, and parent program respondents often say how great the program is and appreciate the education on energy and water efficiency for their kids.

Though the LivingWise Program has been ongoing for nearly two decades, the combined education, instant savings measures and data collection into one program is still unique. Many programs offer only one or two of these items but not all three. This uniqueness is evident in the continuing success of the program.

The LivingWise Program is unlike other programs in that it is designed to be transferable to any county, utility, or region. The program has been used by hundreds of utilities across the country and there are about 200 programs being administered by RAP annually. The program materials are customizable to the utility and the demographics of the targeted area. And the program has been both widely well received by participants and has produced proven energy and water savings in each jurisdiction.

Lessons Learned

- The Program has had 20 years to refine and improve on its model. The primary challenge to overcome in the beginning of the program was getting teachers to find value in the program. The program not only had to satisfy the needs of the clients, but also the needs of the teachers and the state learning standards. They were initially having a difficult time enrolling teachers After 20 years, RAP has learned how to make the program work with the school curriculum which has resulted in the high satisfaction rate. They now have an average 80% enrollment of eligible teachers.

- The program historically faced challenges with messaging and marketing. Their marketing and curriculum teams are always continuing to develop attention-grabbing messages to students and their parents. These messages encourage the parent to take action by helping their child with the take home project to install the kit measures.

- Lastly, remaining in-touch with industry trends for each region and utility type in the country can be a challenge. However, the program has had to adapt and change as technology has changed over the last 20 years and staying relevant as an education tool is crucial to their success.

Additional Resources

For more information on the LivingWise Program, the kit items and other Resource Action Program services see: http://www.getwise.org/index.php

More information on the Resource Action Program is available at: www.resourceaction.com

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Appendix 4: Nomination Form

NOMINATION FORM

PLEASE PROVIDE THE FOLLOWING INFORMATION:

Basic Program Information
Information entered in this section will also be included in the Water-Energy Efficiency Program Directory.

Program Name:

Date of Submission:

Locality(ies) and State(s) in which program operates:

Program category (select only one most appropriate to the program)
(Residential, Commercial, Industrial, Water/Wastewater Treatment & Conveyance, Energy Supply or Generation, Corporate/Government/Institutional Sustainability, Agriculture, Research, Development and Demonstration, or Crosscutting/Other):

Lead administrating organization/company:

Program approach and services provided (one or two sentences):

Technology/end use(s) targeted (one or two sentences):

Useful web links, such as program website, evaluations or annual reports (please give exact URLs):

Approximate annual budget (for most recent year available—please give year):

Source(s) of funding:

Program contact person: Email: Phone:

Information entered from here forward will be used only for the Exemplary Programs Recognition effort and will not be included in the Water-Energy Efficiency Program Directory.

Program Data
(Please specify if data is from a period different from start and end dates listed)

All administrating organizations/companies (if multiple organizations involved, please briefly describe program structure---roles and responsibilities of different organizations):

Program Start Date_____
Program End-date (if not currently ongoing) _____

Approximate Number of Eligible Customers_____
Number of Participants to Date_____

Estimated Annual Resource Savings as a Result of Measures Installed Over the Lifetime of Program
Electricity Consumption (kWh) _____

Electricity Load (Peak KW) _____
Non-Electric Fuel(mBtu) _____
Water (million gallons) _____
Other (carbon dioxide, etc.) _____

Total Administrator Program Costs_____
Estimated Total Customer Program Costs_____

Are evaluation data on program impacts available?

If yes, please attach evaluation or let us know where it can be accessed. Or, briefly describe the methodology, results, and time frame.

If not, is there is an evaluation underway? (if so, when are results expected)?

Brief description of the program
(You are welcome to attach supplemental materials, but if so, please make sure such materials are reasonably brief.)

Services provided (what, how and by whom?)

Background of the program (Particularly: Why and how was the program developed? What barriers to program implementation have been overcome and/or still exist? How has the program changed over time and why were such changes made?)

Reasons for nomination: Why is this program exemplary? Please address each of the following factors in describing program performance and achievements:

- Direct Energy and Water Savings and Other Benefits

- Market Impacts

- Cost-effectiveness

- Innovation

- Customer Service and Satisfaction

- Transferability

System/Sector Data
(As a point of reference for the impacts of the program please answer a few questions about the system and sector in which the program operates)

Annual consumption of system (total resource use in the service territory targeted by the program):
Energy (please include units, i.e., MWh, mBtu, or others as applicable) _____
Water (please include units, i.e., million gallons, or others as applicable) _____

Annual consumption of targeted sector (resource use in the targeted sector within the service territory targeted by the program):
Energy (please include units, i.e., MWh, mBtu, or others as applicable) _____
Water (please include units, i.e., million gallons, or others as applicable) _____

If the service territory of the system and sector are different from the service territory or the programs please explain why and describe the differences:

Attach relevant documents and additional information if desired.

Person submitting nomination:

Position:

Organization:

Phone: E-mail:

Note: Your contact information is for purposes of facilitating any follow-up inquiries. Information about persons and organizations submitting nominations will be kept confidential, unless otherwise requested.

Questions? Feel free to call Eric Mackres at 202-507-4038 or e-mail him at emackres@aceee.org.

Thanks for your submission!