Commercial Water Conservation Audit Program Final Report

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Prepared For
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Acknowledgments

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Executive Summary

Through the direct support from a CWCB Water Conservation Grant the CRC was able to create and fully implement a commercial water audit program for six Colorado utilities. This report details the process of designing the program and the outcomes of the implementation of that program.

The Program Narrative provides a thorough explanation of each Task and related sub-tasks, from laying the groundwork for creating the program, to marketing and advertising the program, training the auditor and support staff, to performing 22 audits and analyzing the data collected during and after. Use of the Brendle Group's CII Audit Tool in Excel provided us with a useful platform for inputting our audit data and calculating the relevant information for businesses that received an audit.

Next, we detail challenges that we faced during the grant and ways that we overcame them and continue to adapt and improve the program. While creating demand for the program was slow at the start, by the spring of 2014 there was sufficient demand for audits and there continues to be demand as the fall auditing season approaches.

In the Audits Performed section we discuss the 22 commercial indoor water audits that we performed during the grant period. We also include all 22 reports in the appendices attached to this report for complete information on each audit. From the data we show that faucet aerators and toilets were the most common fixtures found in all businesses audited, and, in general, these two devices also proved to have the most water conservation potential. Showerheads and urinals showed the next highest water savings potential and were also very prevalent. PRSVs showed conservation potential, but were not as prevalent. The majority of large appliances (e.g. dish washers) encountered were found to be high efficiency models already. Recommendations to businesses for upgrades focused on those fixtures that offered payback periods of 5 years or less, which, at times, meant that the devices that offered the largest water savings potential were not those recommended for upgrades. This criterion for recommendations will be changed in the future so that all water savings options are recommended, however those with payback periods of 5 years or less will be highlighted.

While not a focus of the audits, water records analysis for the reports indicated that most businesses had significant outdoor water use along with indoor use, and therefore this may be an area where we can enhance the program to better meet the needs of the business community with regards to improving efficiency and lowering water bills. Most utilities are contracted with the CRC to offer Slow the Flow irrigation inspections to businesses and therefore many businesses were recommended to make appointments for irrigation audits as well.

Total potential water savings of all businesses audited was 9,252,000 gallons, or 28 acre feet. Total cost savings of all businesses audited was $77, 163. Of all audited industries/facility types the schools showed the highest potential for water and cost savings, however this was mainly a reflection of the fact that 11 of 22 audits were performed at schools.

Survey results are presented in the last section. The survey of the businesses that participated had a representative response rate of 36%, as one of the four responses was from a single participant who represented 5 of the audited schools all from a single school district. While participants responded favorably to the audits, only one of the four reported following up with recommendations and rebates described to them. This finding highlights the need for the program to focus on improving the report and other media that support the task of implementing the recommendations offered to the participating businesses.

Introduction

This report documents the Center for ReSource Conservation's commercial water audit program, as it began through a grant from the CWCB. The purpose of the report is to detail the process of implementing a commercial water audit program, along with lessons learned from implementation of the program, for the CWCB and for other entities seeking to create a similar program. The first section, the Project Narrative, details the main process of the creation of the program and the tasks completed along the way. After the Project Narrative we discuss our challenges and how we addressed them throughout the course of the grant. Next we detail the outcomes of the audits performed, including analysis of water savings and participant survey results. While water savings are ultimately the goal of the program, this report focuses more on program implementation efforts in order to help other groups that are creating their own commercial water audit program. At the end we provide a complete appendix with all program materials that we developed and all reports that we issued over the course of the grant.

Project Narrative

Below is a detailed narrative describing the project progress from start to finish of the Commercial Audit Program grant. The non-italicized text is the project narrative from the grant; the *italicized* text under each task describes the task progress.

Task 1: Lay the Groundwork to Expand the Indoor Audit Program to the Commercial Sector

Task 1 includes everything required so the program is ready to be implemented in new areas, including hiring and training auditors. In Task 1, the program will build heavily off the Colorado WaterWise CII work. These include:

- Survey existing audit programs focusing on indoor use by commercial entities to understand program details and best management practices
- Design the program structure and program branding
- Make any changes or updates to the Colorado WaterWise auditing form and prepare the form for use.
- Develop a program proposal for partner utilities
- Solicit utilities for 2013 - 2014 participation and develop agreements with utilities
- Develop auditor training agenda and presentations
- Perform test audits to test procedures and systems
- Build a database for audit information
- Create scheduling systems for audits
- Purchase equipment and materials for the auditor

Task 1 includes the following deliverables:

- Utilities signed on for program participation in 2013 - 2014
- A training agenda
- Audit database
- Online scheduling tool

Task 1 was completed November 22, 2013.

We surveyed existing commercial water audit programs at various utilities across the country including Denver Water, City of Austin (TX), Portland Water Bureau (OR), and others. From surveying these programs we learned several things. One of the most significant lessons was that there are generally two kinds of commercial audit programs: programs that are designed for working at many industries and business types, and programs that are designed for a single industry. The City of Austin, for example, focuses on a single industry, the hotel industry. This kind of focus allows the program to go very in-depth, most likely providing highly significant results in water savings. However this kind of focus also requires a lot of expertise on the part of the auditing group and the audit process is necessarily more involved than an audit process that only focuses on a single industry-type. It also appears that the business being audited has to be significantly committed, time-wise and money-wise, for the audit to occur. We decided to create a program that could be applied to a broad array of businesses, with a focus on businesses with water use similar to that found in restaurants and hotels, as we believe that it is important to promote conservation to as large of a group of commercial entities as possible. We also wanted our program to be appealing to as many utilities as possible and therefore did not want to limit our services to a single industry.

The structure of the program was designed and is nearly identical to our structure for Slow The Flow (STF) for HOA and commercial groups, with one additional component. For the HOA and commercial STF program we direct potential customers to our website where they can read about what the audit entails, and then they are directed to call our Water Conservation Associate to schedule an appointment. On the scheduled date we send our auditor to perform the audit. Finally, we deliver a detailed report to the business that explains their water use and sprinkler system issues. With the indoor commercial water audits, we have similarly built a web page where interested businesses can read about the program, and we direct them to call us to schedule their audit. The additional component is that we ask them to complete a short survey about their business before calling. The link to this survey is on the website. The survey asks for basic location information as well as business type, size, water, electricity and gas billing information and a few focused questions about water use and reasons for the audit. The hope was to gather information from this survey to help us to better serve each business, as the information gathered would allow us to make educated estimates of the length of time that we would need to complete the audit. The survey also prepares the business for the types of questions that we will ask during the audit, such as for information about utility rates. Unfortunately, we did not have a very high response rate to this survey. We have decided that this survey is not a necessary component of the program and that instead we will attempt to collect the information needed during the time of scheduling the audit.

Like the STF program, we issued detailed reports to businesses after the audits. These reports included analyses of the building water usage, recommendations for water savings, and cost-benefit analyses of the recommendations. One section in the report also addressed best management practices, particularly focused on leak detection. Any rebates available to the businesses were described and recommended in the report.

The report was one aspect of the program that continues to be updated. We see the report as our primary opportunity to incite and educate each business on water conservation benefits and methods, therefore we continue to make changes to the report that we believe will enhance it's impact on implementation and education around water conservation.

Branding of the program took a different turn than we had originally envisioned. We originally envisioned creating a unique program name and logo; however after reviewing other commercial audit programs from around the country we learned that very few of the programs had significant, traditional brands. The program websites tended to be very descriptive, informational, and to-the-point. We feel that this lack of more traditional branding makes sense for our goals of communicating frankly with commercial establishments. We decided that similar to most other commercial water conservation programs we needed material that had a straightforward emphasis on describing the program and it's benefits. We also tried to highlight the potential cost-savings that a business could expect to receive from the program. As you can see on our website, the program is simply called "Indoor Commercial Water Audits" and "Indoor Water Conservation Audits." As we move

forward with the program we will continue to evaluate how well this decision serves our purpose, and if need be, we will seek out a different branding approach.

The Colorado WaterWise auditing form – which we refer to as the commercial audit "tool" – is an Excel spreadsheet created by The Brendle Group, through a partnership with the City of Boulder. The City of Boulder and The Brendle Group have worked with us on specifications of the tool and have listened to our suggestions as they work out the details of the final version of the tool. At this point, we are participating in a pilot program, hosted by The Brendle Group, to test the tool. Due to the challenges of using the tool on a tablet, we are using the tool mostly in the office on a computer, and we have designed a paper form where we record the data needed for the tool input and then we enter it into the tool later. The tool has been very helpful with generating useful information and recommendations to provide our customers within the reports. We consider it an essential part of the program and would be less able to provide businesses with recommendations on water conservation measures without it.

We are using this tool as our primary medium for collecting information and data during the audit. The tool itself has several worksheets that require different inputs. It uses the input information to come up with a custom report that describes the costs and payback periods of all possible fixture and appliance upgrades. It also creates a graph to visualize the water savings from the recommended upgrades. Overall, we are happy with the tool. Because we are in direct communication with the creator of the tool, The Brendle Group, we will be able to continue to suggest improvements and report issues as we use it for our work. Finally, the tool has helped us to complete another subtask listed above, that of creating an audit database. Water usage data, collected from the water providers after the audit, will also be compiled into a single spreadsheet and used for analysis further along in this project (Task 5). And while the database itself is not included with this report, it will be maintained in a spreadsheet/data-tracking software and used for measuring the progress and impact of the program over time.

Our main proposal to garner interest and support in this program from our partner utilities was presented at our annual meeting at the beginning of November 2013. This presentation got three quick responses from The City of Thornton, Centennial Water & Sanitation District, and Westminster. Later on we received interest from Erie, Broomfield, Golden and The City of Boulder. We were able to create a contract with and successfully perform audits for all of these utilities, except with the City of Golden.

*We have developed a full auditor training agenda (**Appendix 1**) and have trained one auditor, our lead Water Technician. We did hire a consultant (Peter Mayer of Water Demand Management) to help us design and perform the trainings. See Task 3 for further discussion of this task.*

As mentioned above, the scheduling for these audits is set up nearly exactly like our scheduling for STF HOA and commercial audits. Our Water Conservation Associate has been trained and is helping to schedule audits and answer questions regarding the program. Scheduling the audits has also been the responsibility of the program manager, who has taken on this work in times when the scheduling process requires significant back-and-forth communication between the CRC and the business.

In addition, the program manager led the main effort in recruiting businesses, along with the help of the participating utilities, and therefore, if the opportunity for scheduling an audit came up during the recruitment process, it was acted upon by the program manager, rather than requesting that the business call back to schedule with a different person.

All equipment and materials were purchased for the audits, a list is provided in ***Appendix 2****. We choose equipment and materials based off of other program recommendations and with the help of the hired consultant.*

Task 2: Market and Advertise the Program

In order for a commercial, indoor water-audit program to be successful, potential participants need to be aware of and excited by the program. In Task 2, the CRC will develop marketing materials for the program and will work with partner utilities to advertise the program to their commercial customers. Steps involved include:

- Design marketing materials
- Certificate of participation
- Design a commercial, indoor water-audit section of the CRC's website
- Coordination between the CRC and partner utilities to facilitate advertising
- Advertising of the program by partner utilities to their customers

This task was completed by November 13, 2013.

This task is 100% complete, with advertising of the program in 5 participating utility districts. The design of marketing materials, including the website, a brochure and a certificate of participation for the program, were all created under the grant. The link to the website is: http://conservationcenter.org/water-home/indoor-water-conservation-for-businesses/ . These materials are being used to promote the program along with direct phone calls and direct mail that our water provider partners are supporting. Coordination of marketing efforts is also currently underway, and is an ongoing process. As with our other conservation programs, no single marketing approach works for all situations, and we expect to have to continuously assess and adapt our marketing approach as time goes on and as we add more water providers to our list of partners for this program.

Advertising of the program was individualized for each participating utility. Several chose to send out an introductory letter, and then make a follow-up call. Others went door-to-door to do outreach efforts. Several of the utilities used their internal business development groups to do the outreach, as these groups often have contacts within the business community. Despite the efforts made by all of our participating utilities, as well as our own marketing outreach, we had a significant challenge generating demand and getting businesses to sign up for the program. A reoccurring challenge within this arena is getting in contact with the appropriate decision-maker within the business. Small businesses often have a manager or the owner available to communicate with at all times, but larger businesses tend to have more management layers, making it more difficult to find the right contact. When able to reach the appropriate contact within a business, we had more success with signing up businesses for the service, especially when the utility was able to alert them to the

program's existence beforehand. The utility's authority was often the most beneficial aspect with convincing the business to accept the free service. More of this challenge will be discussed in the "Challenges & Lessons Learned" section below.

Task 3: Hire and Train Program Staff

In this task, the CRC will hire and train staff for the program. Staff includes a water conservation technician to perform the audits, and a conservation associate to schedule the audits. Technician training will be three days long. CRC staff will conduct most of the training, but the CRC may bring in outside experts to assist with certain topics.

Task 3's deliverables include one trained technician who is capable of performing high-quality commercial audits, and one associate hired and trained to schedule audits.

This task was completed by October 31, 2013.

This task is 100% complete. We have hired and trained a water conservation technician and he has helped to perform all 22 of the program's audits under the grant. Training occurred in October and was done in collaboration with a hired consultant. The consultant also helped us to create a set of training materials that can be used to train future auditors. We also have a Water Conservation Associate who has been trained to schedule the audits.

Task 4: Perform Commercial Audits

Task 4 involves several sub-tasks:

- Record requests for audits
- Contact customers to schedule audits
- Gather water use information from utilities for each customer
- Perform audits on-site with commercial customers
- Collect audit data
- Manage program staff

Task 4's deliverable is the completion of as many audit hours as the CRC is able to complete, with a maximum limit of 375 hours.

The CRC completed this task with 132 audit hours by May 30, 2014.

This task is complete[1]. Due to a late start with generating agreements with water providers we were unable to complete this goal by December 31st, 2013, as originally proposed. After early March of 2014, we realized that we would not be able to complete the task as originally planned, with a total of 375 audit hours performed. Demand was harder to generate than expected, as was getting water providers

[1] It is important to note that the original deliverable of 375 audit hours was not reached, however, with regards to the update to the deliverables on April 7, 2014 (via email) to as many audit hours as possible by May 30, this task is complete.

interested in supporting the program. Once several water providers had shown interest, the follow up process with them was slower than expected, causing lead generation to be slow. Fortunately, once we had several water providers signed up and working with us to recruit businesses for the program, demand finally picked up. We were able to complete 22 audits, totaling 132 audit hours, for the grant. The section, "Audits Performed," details all audits and the findings from each.

Overall, the audits went smoothly and were received well by the staff that we interacted with. Survey results, presented in sections below, support this perception. Furthermore, there is still demand for more audits and we are already planning for continuing the program in the Fall of 2014.

Another positive outcome from performing these audits is that we are learning a lot about the water conservation opportunities within the business community. Our compilation of the data from all 22 audits is presented in the "Audits Performed" section below. This data provides us with insight into significant opportunities that exist within the commercial sector for fixture upgrades and replacements and other water savings.

Task 5: Data Analysis and Reporting

The Commercial Indoor Water Audit program includes a significant data collection component to aid partner utilities in understanding commercial customers and targeting conservation programs. In Task 5, the CRC will compile and analyze data collected during audits of commercial facilities, perform a customer feedback survey, and write program reports based on this data. The CRC anticipates providing one report to each partner utility containing data from their targeted commercial customers for each year that the program is performed and one general report containing all data collected during the program. The CRC will make the general report available to the water conservation community and will make efforts to present its findings.

The CRC anticipates that the data collected and analyzed will include the following:

- Basic information about each business
- Number, type, and flow rate of fixtures found at each business
- Water savings potential from fixture replacements at each business
- Fixture replacements performed on-site at each audit
- In partnership with staff at some partner utilities, rebates applied for by commercial, indoor water-audit customers
- Leaks and other problems found at each business
- At the end of the first year of the program, results of a follow-up survey of audit customers

The follow-up survey will consist of a phone survey of commercial water audit customers, conducted after audits are completed for the year. The survey will include questions concerning both customer satisfaction and the impact of the program.

Task 5's deliverables include a completed commercial customer survey, a program report provided to each partner utility, and a program report made available to the CWCB and the general public.

This task is complete as of July 31, 2014.

We collected the data about each business at each audit, and therefore have all of the information needed for detailing the number, type and flow rate of fixtures found at each business. The CII Audit Tool that we are using, provided by The Brendle Group, calculates the water savings potential from fixture replacements, and therefore this information was readily available as well. All of this information is presented in the "Audits Performed" section. Overall, the results do show that there is significant water savings potential among the 22 businesses audited. Trends in the data indicate that the greatest water savings potential exists for a few different fixture types, including faucet aerators, tank toilets, showerheads and urinals. These fixtures were found to be the most prevalent, which contributed to the estimated high water savings potential through their replacement. The aggregated water savings potential, which is the compilation of potential water savings as calculated by the CII Audit Tool is, in part, determined by the prevalence of each fixture, and due to the prevalence of hand wash sinks across all business sectors, faucet aerators found to have the highest potential water savings. Other findings are reported in the "Audits Performed" section below.

For the survey and feedback, we decided not to do a phone survey, which may have discouraged honest responses from the audit participants. Instead, we sent out an online survey that allowed for anonymity. ***Appendix 3*** *contains a screen shot of the survey. We have received 4 survey responses. One of the responses was from a school district that received 5 audits and therefore this response applies to 5 of the 22 audits that were performed. Percentage-wise 36% of the businesses provided us with feedback on the service. Overall, the results show positive responses to the audits and reports, however very few businesses reported having followed-up with the recommendations provided to them in the report for fixture upgrades. This may be a factor of the duration of time between when the businesses received the report and when they received the survey, which was one or two months time, and possibly too short for fixture purchases to be made. It also may be a factor of the effectiveness of the reports at providing the businesses with the information they need to make the purchases, and this is one factor that we hope to address through changes made to the reports.*

Final reports were sent to all water providers that participated in the program, including the City of Boulder, City and County of Broomfield, Centennial Water District, Town of Erie, City of Thornton, and the City of Westminster. These reports included an explanation of audit procedures, details of all audits performed within the district, a discussion of water savings potential identified during the audit, and information on the quantity and type of water fixtures found across the different business types audited among all water providers. Survey results for all audited businesses were also presented. ***Appendix 4*** *contains an example of one of these reports.*

Program Challenges

In the Project Narrative we touched on our main challenges encountered while working on this program. Our greatest challenge was generating demand and leads for participants in the program. Another, smaller challenge was getting businesses to take the online pre-audit survey that we used to gather information to enable us to adequately prepare for the audit. We also felt challenged to create materials that effectively equipped and motivated the businesses that we audited with the information and resources that they needed to implement the water conservation opportunities that we identified. In this section we discuss each of these challenges, how we addressed them during the time of the grant, and how we plan to address them as we carry the program onward.

Overall, generating demand within the business community for the free water audit program was our greatest challenge. By the end of the grant period we did begin to see an increase in demand as a result of our efforts, and we feel that moving forward, we will be better equipped to increase demand in this sector for the audits.

To generate demand for the audit program we took several different approaches, and tailored our approaches to each water utility's needs. In some water districts we worked with utility water conservation staff to craft letters to send to the business community. With others, the water conservation staff contacted businesses that they wanted as participants in the program first, either through a phone call or an in-person visit, and then provided us with contact information to follow-up with that business and schedule the audit. This second method, with direct, person-to-person contact from the water utility staff to the business owner/manager was the most successful form of outreach at generating leads for the program. We believe that this is because the water utility staff hold some amount of authority in the eyes of the business community, and also some amount of trust that they are offering a service for the good of the company, rather than to earn a profit. When the CRC was the first in line to contact the businesses, or only a single mailer had been sent, the leads were much harder to generate.

In order to improve our outreach efforts we have come up with two main strategies, and we hope to try both of these out this fall, in combination with each other. The first strategy is more traditional and includes a list of new, different and alternative marketing approaches. While going through the utility did generate the most leads, it is also a strategy that is dependent upon the utility staff's time and availability. Because we want to grow this program and offer it to many utilities, we do not want to only depend on utility staff time for the program's success. Other marketing channels for commercial water audits that we plan to try include: presenting at Chamber of Commerce meetings and events, presenting to citizen-powered advisory boards, speaking at professional membership group meetings (e.g. Colorado Hotel and Lodging Association), and placing adds in business parks and short articles in

local newspapers and online periodicals. We believe that by reaching businesses through organizations that they recognize, the service may have more appeal.

Our second idea for generating greater demand is through the implementation of a pre-rinse spray valve (PRSV) replacement program, similar to the Lafayette Rinse & Save program that we ran for them this year. Through our experience with this program we see it as an opportunity to "get our foot in the door" and make our own contacts within the business community. Through running Rinse & Save we found that a PRSV replacement program can be run with less pre-implementation outreach, as the program itself is a mechanism for outreach and education. Through a single letter from the City to the targeted businesses and door-to-door outreach by our water technician, we were able to test over 50% of the eligible business's existing PRSVs, and replace 25 inefficient PRSVs in approximately one month's time. Among the 22 businesses that received a free PRSV, 12 stated that they would be interested in a more comprehensive water audit. While we may not be able to turn all of these into leads, even if 50% did sign up for a complete commercial audit, we would receive a significant amount of business for the commercial audit program.

Another challenge of the program was getting business participants to use our online, pre-audit survey. Our hope was that from the website or from a request through our scheduler, the business would use the link posted on the program's website to give us some basic information about the business and it's water use. Whether people forgot or did not want to fill it out, only six businesses ended up using it. The utility, for the CRC, of having this information allows us to both gather accurate contact information as well as plan for the amount of time that the audit will take and it provides us with information on the types of fixtures that we are likely to encounter. It also serves as a preparatory tool for the business contact, so that they become more familiar with the type of information that we will be gathering during the audit. Because it is not necessary for us to perform the audit, however, we do not foresee the continuation of it's use. Instead, we will likely try to gather this information during the scheduling process, much like we do for the Slow the Flow sprinkler inspection program. In order to do this we will need to update the scheduling process and script, and to train the scheduler on the questions to ask. We will implement this change starting this fall of 2014.

Another challenge that we are continuing to address as the program grows is to create materials for participants that will incite and enable them to implement the water conservation upgrades that we recommend them. Throughout the grant period we worked to address this issue by making some minor and some major changes to the reports. **Appendix 5 a-f** contains an example report to six different businesses, one from each water district where we performed the service. These reports do show some of the changes made to the reports over the period of the grant, with the more recently written reports providing more information for the business. Another concern with the report was that it was too long and wordy to be read by many business managers, owners or maintenance staff, who are themselves, very busy and tasked with many responsibilities beyond ensuring efficient water

use in their business. Therefore, we thought that if we were to make the report shorter, more to-the-point, and action-oriented, the program itself would have a greater impact. An example of our new form of report is included as **Appendix 6.** We feel that the main information that we conveyed in a full-length report is still conveyed in this format, but it hones in on the most important components – *what* they can do to improve and *how* they can improve. And the format lends itself to being a call to action, including the title of the report, "Water Conservation Action Plan" and check box list of recommended upgrades. In the future we also plan to redesign the website to be more of a resource for the businesses that are seeking to make the upgrades to their fixtures. We will continue to evolve and improve upon the report as the program continues, through participant feedback and investigation of water savings.

Audits performed

For the grant, we performed 22 indoor commercial water audits for seven broad industry categories/facility types including schools, restaurants, office buildings, hotels, elder care and living, salon, and some miscellaneous industries (homeless shelter, golf club). Table 1 below lists each business, industry/facility type, water district they reside in, and the date of the audit.

Table 1. List of audits performed, with industry/facility type, water provider, and date audited. Schools include district name, if applicable.

Business/Location of Audit	Industry/ Facility Type	Water Provider	Audit Date
Egg Roll King	Restaurant	Centennial W&SD	4/9/2014
Le Peep	Restaurant	Centennial W&SD	4/10/2014
Sola Salon	Salon	Centennial W&SD	4/10/2014
Broomfield High School, BVSD	School	City and County of Broomfield	1/2/2014
Aloft Broomfield	Hotel	City and County of Broomfield	4/18/2014
Omni Interlocken Resort	Hotel	City and County of Broomfield	4/21/2014
Beautiful Savior Lutheran School	School	City and County of Broomfield	4/23/2014
Holy Family High School	School	City and County of Broomfield	5/5/2014
Broomfield Academy	School	City and County of Broomfield	5/13/2014
Boulder Shelter for the Homeless	Misc (Homeless Shelter)	City of Boulder	8/9/2013
University Hill Elementary School	School	City of Boulder	1/6/2014
Elms Haven Nursing Home	Elder Care/Living	City of Thornton	11/13/2013
DoubleTree by Hilton	Hotel	City of Thornton	1/8/2014
United Chinese & Sushi Restaurant	Restaurant	City of Thornton	4/8/2014
Thornton Elementary, Adams 12	School	City of Thornton	4/21/2014
Hunters Glen Elementary, Adams 12	School	City of Thornton	4/23/2014
Tarver Elementary, Adams 12	School	City of Thornton	4/25/2014
Horizon High School, Adams 12	School	City of Thornton	4/30/2014
Riverdale Elementary, Admas 12	School	City of Thornton	5/1/2014
US Western Investment Co.	Office Building	City of Westminster	5/13/2014
Exploring Minds Academy	School	Town of Erie	5/6/2014
Colorado National Golf Club	Misc (Golf Club)	Town of Erie	5/12/2014

As shown in the table, six different water utilities were involved with the program, including Centennial Water & Sanitation District, City and County of Broomfield, City of Boulder, City of Thornton, City of Westminster, and the Town of Erie. Nearly all audits were performed in April and May of 2014, after sufficient demand had been generated through the combined outreach efforts of the CRC and the participating water districts. In the fall, at least four of these six have stated interest in continuing the program and the CRC has maintained a list of potential commercial customers and will enhance outreach efforts through new marketing strategies as explained above.

Between the different industries/facility types, indoor water use and water fixtures did vary, but not strongly. Table 2 details fixture numbers, by industry. Faucet aerators and tank toilets were universal across all industries. Clothes washers and urinals were the next most common fixture, occurring in six of the seven industry categories. Dishwashers, re-rinse spray valves (PRSVs), and ice machines were found in 5 of the 7 industries. All other fixtures, dual flush toilets, flushometer toilets, and food disposals were found in only 2 of the 7 industries.

Table 2. Quantity of fixtures by industry. The number in parentheses next to the industry type indicates the number of businesses that were audited in that industry.

	Industry/Facility Type (Quantity visited)							
Fixture	Elder Care/Living (1)	Hotel (3)	Misc (2)	Office Building (1)	Restaurant (3)	Salon (1)	School (11)	Sum Total
Faucet Aerator	264	685	24	51	25	4	359	1412
Clothes Washer	3	6	2		1	1	5	18
Dishwasher	1	3	2		3		9	18
Dual flush toilet							48	48
Flushometer toilet		10					100	110
Food Disposal			1		1			2
Ice Machine	2	21	1		4		2	30
PRSV	2	7	3		3		12	27
Showerhead	135	669	26			32	21	883
Tank Toilet	173	629	27	28	12	4	192	1065
Urinal		7	7	7	4	1	149	175

Of the 1,412 faucet aerators encountered, less than 10% met WaterSense standards of 0.5 gallons per minute (gpm) flow rate for bathroom faucets and the water efficiency standard of 2.0 gpm for kitchen faucets. Due to their prevalence and low costs for replacement and installation, faucet aerators were the most commonly recommended upgrade between all 22 businesses.

Tank toilets were the next most common fixture, and of the 1,065 encountered, only 9 met or exceeded the WaterSense standard of 1.28 gallons per flush (gpf). We did not recommend upgrades for toilets as often, however, due to the high cost of replacement which causes payback periods to be much longer than businesses are willing to consider. In the future, with the updated reporting format, all fixtures with water conservation potential, even with longer payback periods, will be recommended to be upgraded, however the items with longer payback periods will

be designated differently than those that are more cost-effective for the business to pursue.

Of the businesses audited that had large water-using appliances (i.e. clothes washers and dishwashers), the majority already had high efficiency, ENERGY STAR rated models. For both appliances, we encountered 18 units, and similarly 14 of those 18 of each were already high efficiency models. This finding suggests that rebates and water conservation programs targeted at these kinds of fixtures may not have as large of a pool of candidates as rebates and programs that target aerators, toilets, PRSVs, showerheads, and urinals, which were much less commonly high efficiency models.

The participating water utilities provided us with water usage history for each business that participated in the audit. Historical water usage analysis revealed annual and monthly trends. Most businesses did not have separate meters for indoor and outdoor use. Therefore, when possible, we estimated indoor and outdoor usage. Overall, most water records indicated that outdoor water use was a significant factor in the total water use among the businesses audited. An example of the monthly water use from one of the private high schools in Broomfield's water district in Figure 1 displays a typical seasonal usage pattern, with peaks in the summer months when outdoor watering occurs.

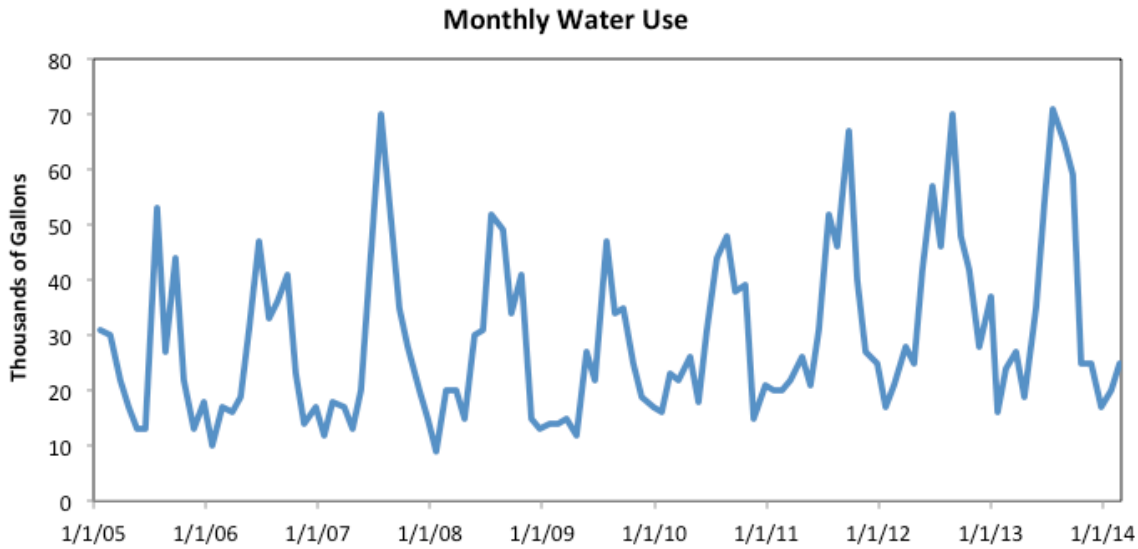

Figure 1. Monthly water use for private high school from 2005-2013.

This kind of figure also served as a useful tool for recommending monthly monitoring of water bills. For example, for this school it should be recommended that if water use within a single summer month was above 60,000 gallons or winter use within a single month was above 20,000 gallons, then action to investigate for possible leaks or significant inefficiencies should be taken.

Total annual use was also provided to each business. Figure 2 shows the total annual use and estimated annual cost for a Thornton restaurant. Graphs such as this were used to provide businesses with some sense of how much water they were using and how much it cost them annually. The cost estimate was not always included with the annual usage information due to challenges with calculating the estimated cost, however in the future this may become a standard part of the report if we find it useful for encouraging businesses to implement the water conservation recommendations.

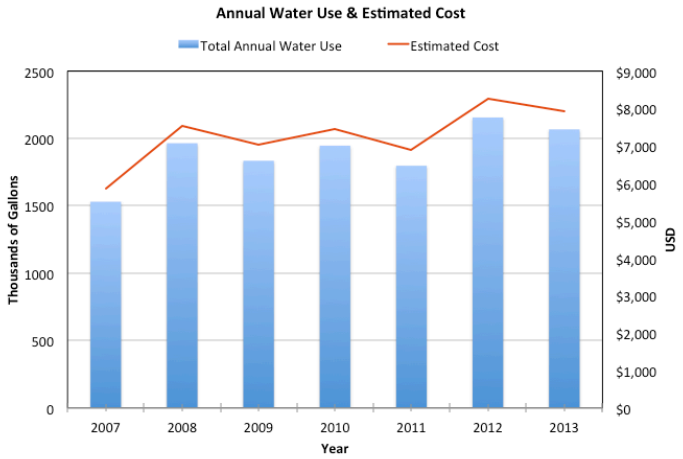

Figure 2. Annual water use (blue bars) (thousands of gallons) and estimated cost (red line) ($) from 2007-2013 for a Thornton restaurant.

Water Savings

Water savings potential was calculated by the audit tool created by The Brendle Group. The tool took several factors into account when calculating water savings including the number of fixtures, the flow rate of the fixtures, the number of business days open per year, and the number of fixture users. Table 3 details the total water savings potential by fixture from all 22 audits performed for the grant. Again, faucet aerators had the highest water savings potential, in part due to the prevalence of their existence within all businesses audited. Tank toilets, showerheads and urinals had the next highest water saving potentials. While PRSVs have somewhat low water savings potential, their prevalence and low replacement cost provided for them to be the second most commonly recommended upgrade.

Table 3. Potential water savings (kgal) by fixture type, from all 22 audited businesses.

Fixture	Water Savings Potential (kgal)
Faucet Aerator	3,362
Clothes Washer	12
Dishwasher	74
Dual flush toilet	0
Flushometer toilet	100
Food Disposal	131
Ice Machine	6
PRSV	74
Showerhead	1,347
Tank Toilet	2,901
Urinal	1,245
Total Savings Potential	**9,252**

Clothes washers, dishwashers, dual flush toilets, and ice machines all had low to non-existent water conservation potential. As stated above, the majority of these items were already meeting or exceeding WaterSense and/or ENERGY STAR standards and therefore were not often recommended for upgrades. With regards to the large appliances, this finding suggests that the CII sector has already made investments in high efficiency machines within these water districts, and potentially, large appliance replacements may not be an area that requires as much utility assistance as some of the other water-using fixtures.

Actual water savings were not measured for this grant, as the time frame for the grant did not allow for sufficient time to measure actual change in water usage. Another challenge of measuring actual water savings from commercial water audits is accounting for the changes in the number of water users. For example, at a restaurant, total number of customers is not often tracked, and therefore any change in water use cannot be evaluated simply as before audit usage vs. after audit usage. Similarly with schools or other facilities that have an annual changeover in water users, comparisons from before and after cannot be done simply. In the future, the CRC will work to measure actual water savings from the commercial audits, at least for a representative sample of businesses involved with the program.

The audit tool Results page is shown in Figure 3 below. This same table was included in each audit report to all businesses. It is a comprehensive table detailing savings of many different kinds, including water, electricity, natural gas, and cost savings for each fixture, individually, and all together. The table also allows for customization of recommendations, and as stated, the CRC used a cutoff of a 5 year simple payback period as the maximum amount of time for which a fixture upgrade would be recommended. Rebate opportunities and total water use are also included here.

CII Water Assessment Tool - Results | Aloft Hotel | v 1.4

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	141	122	0	254	$747	$0	$183	$930	$0	$4,230	4.5	yes	168
Pre-rinse spray valve	0	-10	0	-21	-$60	$0	-$15	-$75	$0	$0	0.0	no	16
Toilet	139	45	-	-	$276	-	-	$276	$10,425	$83,400	264.8	no	238
Urinal	4	42	-	-	$260	-	-	$260	$400	$2,400	7.7	yes	85
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no	566
Clothes washer	0	0	0	0	$0	$0	$0	$0	$0	$0		no	9
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	91
Ice machine	1	6	1,112	0	$38	$100	$0	$138	$0	$0	0.0	yes	152
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Total of All Measures		**206**	**1,112**	**234**	**$1,260**	**$100**	**$168**	**$1,528**	**$10,825**	**$90,030**	**51.8**		
Total of Included Measures		**171**	**1,112**	**254**	**$1,045**	**$100**	**$183**	**$1,328**	**$400**	**$6,630**	**4.7**		

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ) 31%
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants) 8%

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Figure 3. Example results from CII audit tool.

The "report" section of the audit tool included another table and a chart, shown in Figure 4a and 4b below. These were also printed in each full audit report sent to the participating businesses. The table in 4a shows the averaged simple payback period, taking into account all recommended upgrades. Total installed cost for the recommended upgrades and total potential rebates are also shown here. The chart in 4b shows a bar chart of the water, electric and natural gas cost savings associated with each potential fixture upgrade. Often the electric and natural gas cost savings were quite low, but the water cost savings proved to be more impressive.

4a

City of Broomfield Water Conservation Assessment Report

Aloft Hotel Primary Contact: Ryan Ikemeire
8300 Arista Pl
Broomfield, CO 80021

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	141
Urinal	4
Ice machine	1

Annual Savings*	Resource	Cost
Water	170,700 gallons	$1,000
Electricity	1,100 kWh	$100
Natural Gas	250 therms	$180
Total Savings	-	**$1,280**
Installed Cost**		$6,600
Potential Rebate***		$400 +
Simple Payback		**4.7 years**

4b

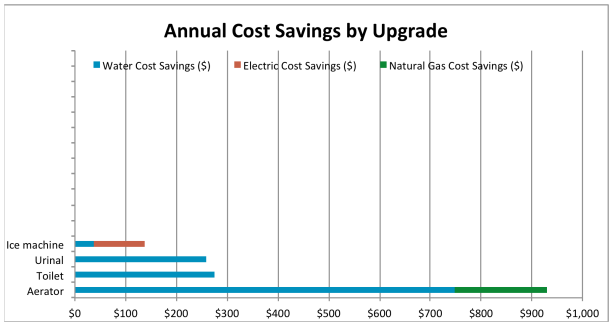

Figure 4a. Example report from CII audit tool detailing annual water, electricity and natural gas savings for aggregated recommended fixture upgrades. Averaged installed costs, potential rebates and payback period as well. Figure 4b. Example of annual cost savings by upgrade graph from the audit tool report.

Table 4 shows the potential water savings and total cost savings by industry/facility type. The total cost savings includes calculations for reductions in the use of electricity from reduced hot water use. By industry/facility type, the schools and hotels audited show the most potential for savings. This finding also reflects that 50% of all audits performed under the grant were for schools. Hotels made up another 14% of all audited buildings. The size of each business and number of fixtures and water users, also make a significant difference when estimating water savings and cost savings potential.

Table 4. Potential water (kgal) and cost savings ($) by industry/facility type. The number of each industry/facility type audited is included in the parentheses.

Industry/Facility Type	Total Potential Water Savings (kgal)	Total Potential Cost Savings ($)
Elder Care/Living (1)	1,157	$8,318
Hotel (3)	2,047	$17,457
Misc (2)	1,197	$11,529
Office Building (1)	392	$4,721
Restaurant (3)	304	$2,452
Salon (1)	162	$1,750
School (11)	3,993	$30,936
Grand Total	**9,252**	**$77,163**

Fixture replacements were performed at some of the sites, but this was not a focus of the audits. In part, this was due to the fact that we had not received orders for the fixtures purchased for the grant until late in the grant period, and therefore did not have the needed variety of fixtures to offer to businesses for trial purposes. We were able to provide two of the eleven schools with a free PRSV. Water savings from these devices are expected to be measureable once the school year begins again in the fall of 2014. Future audits will incorporate fixture replacements as we see these as another means of motivating and instigating water conservation upgrades.

During the audits very few leaks were detected, however leak detection education did occur during the audits and in the audit reports. If toilet leaks or faucet leaks were noticed by our water technician, he made sure to mention them to the participant doing the audit with him. At one site he was able to fix one toilet leak by a simple adjustment of the flapper. Water usage records revealed potential historical leaks at some of the businesses, and were noted in the reports. When leaks or spikes in usage were noticed in historical records, we made sure to use the data to highlight to the business the importance of checking for leaks. Furthermore, the reports detailed the method for detecting leaks by checking the water meter when no water users were known to be in the facility.

Survey Results

Surveys were sent via a link in an email at least one month after the business had received the water conservation report, in order to allow some time for pursuing the recommendations included in the report. The survey consisted of nine questions that focused on the satisfaction of the participant with the audit and the report, and on what actions they had taken to address water conservation based off of the recommendations in the report. While only 4 surveys were returned, one of the four was submitted by a representative from Adams 12 Five Star Schools, which all together received five audits. The overall response rate to the survey was therefore 36%.

The first question in the survey asked participants to rate their overall satisfaction with the free water conservation audit. The average response was 4.75 with ¾ of the responses being a 5 and one being a 4 (Figure 5). Next, the survey asked if the participants had performed any of the recommended fixture upgrades or replacements. Only one of the four responses confirmed that they had followed up with one of the recommended upgrades. In the comment section of this question we learned that the business replaced their showerheads. Another respondent also commented that they "Just got the audit information. Will consider soon," which is positive. The participant that claimed to have upgraded their showerheads also gave the only affirmative response to the next question about whether or not they used any of their utility's rebate options.

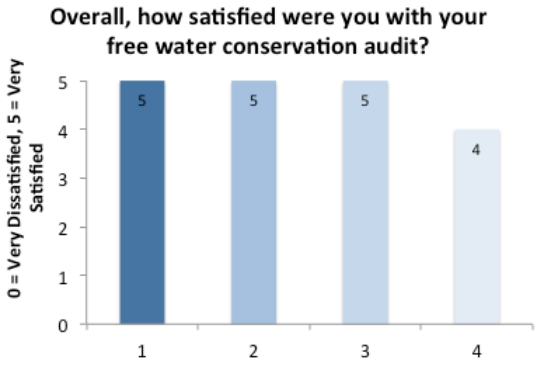

Figure 5. Bar chart of responses to the first survey question, on a scale of 0-5, 0=Very Dissatisfied, 5= Very Satisfied.

The next question addressed participant satisfaction with the report. The average response to this question was 4.67, and was likely lower due to the fact that this question was added after one of the participants had submitted a survey (Figure 6). The following question, which included a Yes/No option and comment section, asked whether or not there was anything not covered by the report that should have been included. One respondent answered "yes" to this question, and commented

that they would have liked more information on irrigation, and that they felt that their business wasted a lot of water on "non-native grasses."

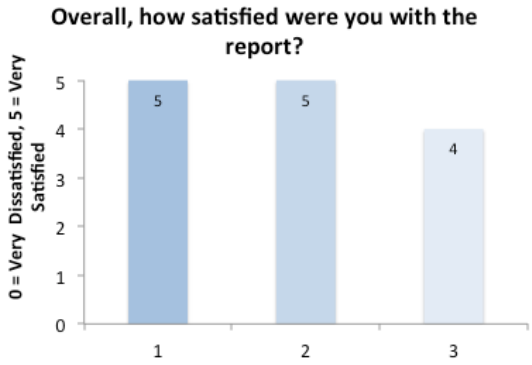

Figure 6. Bar chart of responses to the fifth survey question, on a scale of 0-5, 0 = Very Dissatisfied, 5= Very Satisfied.

Our final service-related question asked the business if they would recommend the service to another business. This question got two "yes" responses and one "maybe" response. The fourth, again, did not have the question in the previous version of the survey. In the comments section of this question one participant wrote: "availability of low flow devices is probably not widely known." While this response does not seem to directly pertain to the question under which it was written, it does tell us that at least one of the respondents did not feel that they did not have sufficient knowledge of where to purchase high efficiency water conservation fixtures. This is valuable feedback that will be taken into account and addressed in future reporting efforts.

The last two questions asked the business to report from which industry they were from – all three that had the question when they took the survey were from the School/Education/Child care industry. And two of these three left the name of their business – Holy Family High School from Broomfield and Adams 12 Five Start Schools, from Thornton. In the future we hope to receive more feedback from a broader range of businesses as we continue to try to make the audits useful for many different industries.

Conclusions

Through the direct support from a CWCB Water Conservation Grant the CRC was able to create and fully implement a commercial water audit program for six Colorado utilities. The process of creating the program started with research of other CII audit programs that led us to keep our program's focus broad, on all industries with water use similar to a hotel or restaurant. Use of The Brendle Group's CII audit tool in Excel provided us with a useful platform for inputting our

audit data and calculating the relevant information for businesses that received an audit. We also contracted with a local consultant to create an auditor training and to help us through our first two audits and with the design of our audit reports. The systems that we had in place for our other water conservation programs, including our website, our Water Conservation Associate for phone support, and our scheduling tools, were relatively simple to update with the new program information.

Garnering demand for the program was our greatest challenge and was the main factor that set us back from our original timeline and audit number goals, however by the end of the grant period, the program had drawn sufficient demand and interest that we are looking forward to continuing the program this fall of 2014. Other main challenges encountered were getting participants to provide us with information on their facility prior to the audit through our online survey and providing participants with an effective report at the end of the audit. For the pre-audit survey, we do not plan to continue it's use and will gather the information during the scheduling time. For the report, we have already updated the format several times and will continue to do so. We hope to continue to collect feedback on this aspect of the program through survey responses.

While not a focus of the audits, water records analysis for the reports indicated that most businesses had significant outdoor water use along with indoor use, and therefore this may be an area where we can enhance the program to better meet the needs of the business community with regards to improving efficiency and lowering water bills. Most utilities are contracted with the CRC to offer Slow the Flow irrigation inspections to businesses and therefore many businesses were recommended to make appointments for irrigation audits as well.

The 22 audits that we performed provided us with a lot of helpful information about the commercial sector's water use and current water conservation opportunities. Faucet aerators and toilets were the most common fixtures found in all businesses audited, and, in general, these two devices also proved to have the most water conservation potential. Showerheads and urinals showed the next highest water savings potential and were also very prevalent. PRSVs showed conservation potential, but were not as prevalent. The majority of large appliances (e.g. dish washers) encountered were found to be high efficiency models already. Recommendations to businesses for upgrades focused on those fixtures that offered payback periods of 5 years or less, which, at times, meant that the devices that offered the largest water savings potential were not those recommended for upgrades. This criterion for recommendations will change in the future so that all water savings options are recommended, however those with payback periods of 5 years or less will be highlighted.

Total potential water savings of all businesses audited was 9,252,000 gallons, or 28 acre feet. Total cost savings of all businesses audited was $77, 163. Of all audited industries/facility types the schools showed the highest potential for water and cost

savings, however this was mainly a reflection of the fact that 11 of 22 audits were performed at schools.

The survey of the businesses that participated had a representative response rate of 36%, as one of the four responses was from a single participant representing 5 of the audited schools from a single school district. While participants responded favorably to the audits, only one of the four reported following up with recommendations and rebates described to them. This finding highlights the need for the program to focus on improving the report and other media that support the task of implementing the recommendations offered to the participating businesses.

Appendix 1

Center for Resource Conservation

Commercial and Institutional Water Audit Training Agenda

This training agenda was developed for the purpose of training CRC auditors and staff.

1. What is the CII Sector and Why Does Their Water Use Matter?
    a. Commercial, Institutional, and Industrial sector definition
    b. Water use in the CII sector

2. CII End Uses of Water - Overview
    a. Where is water used in the CII sector
    b. Conservation opportunities
    c. Benefits and costs

3. Food Service and Restaurants
    a. Water use patterns and benchmarks
    b. End uses
    c. Pre-rinse spray valve
    d. Dishwasher
    e. Food disposer
    f. Other

4. Hospitality, Lodging, Hotel, Motel
    a. Water use patterns and benchmarks
    b. End uses
    c. Kitchen (same a #3 above)
    d. In-room Use
        i. Toilet
        ii. Shower
        iii. Faucet
    e. Clothes washers
    f. Cooling towers, swimming pools, and other large end uses

5. Conducting a Water Audit
    a. Why conduct an audit?
    b. The audit process
    c. Excel CII audit tool
    d. Fixture and appliance information
    e. Flow measurement
    f. Leak detection
    g. Preparing an audit report

6. Fixture Replacement

   a. Pre-rinse spray valve (video)
   b. Toilet (video)
   c. Other

7. Additional Training Elements
   a. Tablet computer
   b. Audit data and database
   c. Tools and equipment
   d. Useful CII and audit information
   e. How to get additional information
   f. Emergency contacts

Appendix 2

Center for Resource Conservation

Toolkit Specification for Restaurant and Hospitality Audit Program

Items for CRC Auditor

1. Uniform/T-shirt
2. CRC ID card
3. Tablet computer loaded with audit software
4. Available info about audit site (name, address, phone, contact person, type of business, water use history if available)
5. Paper and pen (in case of tablet or software malfunction)
6. Pliers and/or vice grips (small to medium size)
7. Rubber gloves
8. Crescent wrench (2 sizes – small and medium)
9. Screwdrivers – flathead and phillips
10. Teflon tape
11. Flow bags and/or calibrated bucket (2 – 5 gallons in size)
12. Stop watch
13. Plastic tubing or hoses (short lengths of 3 – 5 feet) for measuring flow rates. Diameter must be sufficient to capture all flow from a typical faucet fixture.
14. Flashlight
15. Tape measure
16. Printed handouts and information about CRC and the CII audit program
17. Business cards

Recommended Pre-Rinse Spray Valve Models

The Food Service Technology Center recommends a pre-rinse spray valve with a flow rate of 1.6 gallons per minute or less, and with a cleanability performance of 26 seconds per plate or less, based on the ASTM *Standard Test Method for Performance of Pre-Rinse Spray Valves*.

The following pre-rinse spray valves have been verified by the FSTC to meet this criteria:

- BK Resources PRV-1
- Bricor B064 PRV
- Bricor B074 PRV
- Bricor B084 PRV
- Bricor B094 PRV
- Bricor B095NS
- Chicago Faucet 90-LABCP
- Encore KN50-Y002-12
- Encore KN50-Y103 & Y104 (Straight Stream)
- Encore KN50-Y103 & Y104 (25 degree Fan Position)
- Encore KN50-Y103 & Y104 (15 degree Fan Position)
- Fisher Ultra-Spray 2949 & 71307

Appendix 2

- Fisher 10197 & 13641
- Krowne Metal Water Saver 21-129
- Meisheng M0098SV-065G
- Meisheng M0098SV-124G
- Meisheng M0098SV-142G
- Meisheng M0098SV1-124G
- Niagara N2180
- Strahman Kwik-Clean 3 (Straight Spray)
- Strahman Kwik-Clean 3 (5 Degree Fan Position)
- Strahman Kwik-Clean 3 (15 Degree Fan Position)
- Strahman Kwik-Clean 3 (Tri Tip Position)
- Strahman Kwik-Clean II
- T&S B-0107
- T&S EB-0107-C
- T&S B-0107-C
- T&S B-0107-C & EB-0107-C (60 Plate Test)
- T&S Equip 5SV
- T&S Equip 5SV-C
- T&S JetSpray B-0108
- T&S JetSpray B-0108-C
- T&S B-2108
- Zurn Z80000-PR1

Instructional Videos for PRSV Testing and Installation

PRSV Testing

http://www.youtube.com/watch?feature=episodic&v=RmlbhA2dq4E&NR=1

PRSV Installation

http://www.youtube.com/watch?v=dwBDKra3S-0

Appendix 3

Commercial Water Conservation Audit Survey

9 questions total. 2 min or less of your time. Thank you!

1. Overall, how satisfied were you with your free water conservation audit?

Use the slider to select 0-5. 0 = Very Dissatisfied, 5 = Very Satisfied.

2. Have you performed any of the recommended fixture upgrades or replacements? If yes, please specify the changes made in the comment section below.

- ○ Yes
- ○ No

Comments

3. Did you take advantage of any of your water provider's rebates on low-flow water fixtures?

- ○ Yes
- ○ No

4. If you did take advantage of rebates, who is your water provider? Please select from the drop down menu.

-- Please Select --

5. Overall, how satisfied were you with the report?

Use the slider to select 0-5. 0 = Very Dissatisfied, 5 = Very Satisfied.

6. Was there anything not covered in the report that you think should have been included? If yes, please specify in the comment section below.

- ○ Yes
- ○ No

Comments

7. Is this a service that you would recommend to another business? Please feel free to provide an explanation for your answer in the comment section below.

- ○ Yes
- ○ No
- ○ Maybe

Comments

8. In what type of business do you work?

- Restaurant/Food Service ○
- Hotel/Lodging ○
- Business/Office ○
- School/Education/Child Care ○
- Other ○

9. Would you mind providing us with your business' name? This allows us to better understand which businesses were able to apply the recommendations offered and which were unable to apply the recommendations.

Business Name

Appendix 4

Example Report for a Water Utility on the Commercial Water Audit Pilot Program

COMMERCIAL WATER AUDIT PILOT PROGRAM

7/31/14

Report for the City and County of Broomfield

The City and County of Broomfield participated in the Center for ReSource Conservation's commercial indoor water audit pilot program. Six Broomfield businesses were audited during this time. This report details the program and the findings from the audits including water savings potential.

Commercial Water Audit Pilot Program

REPORT FOR THE CITY AND COUNTY OF BROOMFIELD

EXECUTIVE SUMMARY

In the Fall of 2013 the Center for ReSource Conservation initiated a pilot Commercial Water Audit program, in conjunction with six utilities, including the City and County of Broomfield, and funding from the Colorado Water Conservation Board. This report presents the details of the audits performed within Broomfield, as well as some more general information from all 22 audits performed by the CRC under the grant.

Six commercial audits were preformed for Broomfield businesses. Among the six businesses, there were two hotels and four schools. Each business was provided with a report after receiving the audit that detailed their water usage history, upgrade opportunities, water savings, cost savings and payback periods of the recommended upgrades, and rebate opportunities offered to the businesses through the City and County of Broomfield. From the audits in Broomfield and from five other Front Range communities the CRC noticed consistent water conservation opportunities in faucet aerator and toilet upgrades. While low-flow faucet aerators are inexpensive, the inefficient aerators are ubiquitous and prevalent across all industries. Pre-rinse spray valves, showerheads, and urinals were also found, in Broomfield businesses to have high water savings potential. Longer payback periods for toilets and urinals often made them less commonly recommended, as the CRC required a maximum of 5 year return-on-investment, as calculated by the CII Audit Tool, in order for an upgrade to be recommended.

Water records provided to the CRC by the City and County of Broomfield revealed outdoor watering to be a significant portion water use among all businesses audited by the CRC. Slow the Flow Irrigation audits were recommended to most businesses. From water records analysis of other businesses from the Front Range, outdoor watering is typically a large portion of the commercial sector's water use in Colorado and programs to address this issue may be useful at reducing water use within this sector.

Responses to an anonymous follow-up survey of all businesses from the 22 audits indicate that the service is highly satisfactory with an average response of 4.75 out of 5. The survey responses also revealed that participants had difficulties implementing some of the recommendations given, and therefore the CRC is working to better support the participants in their water conservation efforts.

Demand for more commercial water audits exists within Broomfield's business community. The CRC will continue this service along with the support of the City and County of Broomfield. We will also continue to look for ways to improve this service and we welcome the City and County of Broomfield's questions and feedback.

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LIST OF APPENDICIES

☐ Appendix A. Water Conservation Audit Reports

- Broomfield High School
- Aloft Hotel
- Omni Interlocken Resort
- Beautiful Savior Lutheran School
- Holy Family High School
- Broomfield Academy

☐ Appendix B. Example Certificate of Completion

INTRODUCTION

Commercial water use occurs within a broad array of industries and facilities, including office buildings, hotels, restaurants, schools, recreation facilities, elder care and living facilities, and others. In the US, this sector accounts for approximately 17% of publicly supplied water use[1]. Within the commercial sector, indoor water use typically accounts for 50-100% of the facility's total water use[1]. With increasing water supply challenges in the State of Colorado[2] and the rising costs for water and energy, businesses have the need and incentive to conserve. The Center for ReSource Conservation (CRC), through a grant from the Colorado Water Conservation Board (CWCB), created and implemented a commercial water audit program with several local water districts, providing local businesses with information on their water use and recommendations for cost-effective conservation options that will help reduce their water costs and reduce supply demands for the utilities that serve them.

The City and County of Broomfield was an early adopter of the Commercial Water Audit Program, signing up for audits for the winter of 2013-2014. Before the end of the grant period the CRC completed six audits for Broomfield. In this report we provide a summary of each audit, including the recommendations that we gave to each business with regards to the most cost-effective fixture upgrades. We include a discussion about the potential water savings from the upgrade opportunities as well as the results from a survey of the participants in the program. Along with this report we are including a copy of each of the Water Conservation Reports that we sent to the businesses after their audits, these can be found in the Appendices.

AUDITS PERFORMED

Six different facilities received full indoor commercial water conservation audits from the CRC, with support from the City and County of Broomfield and the CWCB. A list of these businesses along with details of the water fixtures counted and measured during the audit are detailed in Table 1. Data collected during the audit was input into a CII Water Audit Excel Tool, created by The Brendle Group in partnership with the City of Boulder. The CRC is a participant in pilot testing of the Excel audit tool, and is able to use it for free. The tool uses the fixture type, measured flow rate, number of days of operation, and average number of daily users to calculate water savings potential, and if hot water is used, energy and natural gas savings as well, all based off of utility costs for these resources. It also estimates payback periods (in years) for replacing fixtures with WaterSense certified models. The CRC used a maximum payback period of 5.0 years for the criterion for a recommendation for an upgrade, as this was the maximum length of time that we felt that the average business would be willing to consider when making an investment in water conservation fixtures. When available, the Excel audit tool was able to account for rebate opportunities; the $75 toilet rebate and the $100 urinal rebate from the City and County of Broomfield was therefore taken into account when calculating payback periods and was recommended as an option for reducing project costs.

[1] EPA WaterSense website, www.epa.gov/watersense/commercial/index.html
[2] CWCB Statewide Water Supply Initiative, 2004.

Table 1. City and County of Broomfield Commercial Water Audit Details

Audit Date	Customer Name	Industry	Existing Fixtures	Quantity	No. of devices already meeting/ exceeding WaterSense Standards	Existing Flow Rates (GMP or GPF)	Potential Water Savings (kgal)	Potential Cost Savings ($)	Calculated Payback Period (Yrs)	Recommended Measures
1/2/2014	Broomfield High School	School	Aerator	41	41	0.5	-	-	-	
			Dishwasher	1	1	-	-	-	-	
			Dual Flush Toilet	48	48	1.1	-	-	-	
			Ice Machine	1	1	-	-	-	-	
			PRSV	1	-	2.8	3	$24	1.2	✓
			Urinal	27	-	1	41	$190	71.1	
4/18/2014	Aloft Hotel	Hotel	Aerator	154	13	0.05, 2	122	$930	1.5	✓
			Clothes Washer	2	2	-	-	-	-	
			Dishwasher	1	1	-	-	-	-	
			Flushometer toilets	10	10	1.28	-	-	-	
			Ice Machine	3	2	-	6	$138	-	
			PRSV	3	3	1	-	-	-	
			Showerhead	139	139	2	-	-	-	
			Toilet	139	-	1.6	45	$276	264.8	
			Urinal	4	-	1	49	$260	7.7	
4/21/2014	Omni Interlocken Resort	Hotel	Aerator	391	-	1.5, 1.75	463	$3,531	0.6	✓
			Clothes Washer	4	4	-	-	-	-	
			Dishwasher	1	1	-	-	-	-	
			Ice Machine	12	12	-	-	-	-	
			PRSV	2	-	2	11	$83	1.4	✓
			Showerhead	390	-	2.5	556	$4,236	1.8	✓
			Toilet	390	-	1.6	246	$1,508	155.1	
4/23/2014	Beautiful Savior Lutheran School	School	Aerator	29	24	3, 2	10	$78	0.4	✓
			Dishwasher	1	1	-	-	-	-	
			PRSV	1	-	3	11	$83	0.7	✓
			Showerhead	4	4	1	-	-	-	
			Toilet	23	-	1.6	21	$130	105.9	
			Urinal	3	-	1.6, 1	26	$159	10.7	
5/5/2014	Holy Family High School	School	Aerator	45	-	2,3	281	$2,140	0.2	✓
			Clothes Washer	1	-	-	6	$54	2.8	✓
			Dishwasher	1	1	-	-	-	-	
			Flushometer toilets	42	-	1.6	100	$611	36.1	
			Ice Machine	1	1	-	-	-	-	
			PRSV	1	1	1	-	-	-	
			Showerhead	16	16	2	-	-	-	
			Urinal	15	-	1	88	$537	14	
5/13/2014	Broomfield Academy	School	Aerator	48	-	2, 1.5, 2	94	$718	0.7	✓
			PRSV	1	-	1.5	2	$14	3.5	✓
			Showerhead	1	1	1	-	-	-	
			Toilet	34	-	1.6,3.5	163	$1,000	17.8	
			Urinal	4	-	2	86	$523	3.8	✓

Of the businesses audited, one was a public high school, three were private schools and two were hotels. Between these six facilities, five were recommended to upgrade their faucet aerators (to 0.5 gallons per minute (gpm) at restroom sinks and to 1.5 gpm at kitchen sinks) and four were recommended to upgrade to high efficiency pre-rinse spray valves (PRSVs) (1.28 gpm or less).

Showerheads, urinals, and a clothes washer were the other recommended upgrade items. Water savings potential did exist in the replacement of other fixtures such as toilets, however due to their high up-front cost, the return-on-investment was often calculated to be longer than 5 years, beyond what most businesses would consider reasonable for investment. When summing all potential water conservation upgrades between the six businesses, the CRC found there to be a potential annual savings of 2,430,000 gallons. On the other end of the spectrum, the majority of dishwashers, clothes washers and ice machines were found to be high efficiency models, meeting ENERGY STAR requirements. These findings suggest that rebates and conservation programs in the City and County of Broomfield may be best directed at low to medium-cost fixtures (faucet aerators, PRSVs, showerheads, toilets, and urinals) rather than at large appliances (dishwashers, clothes washers and ice machines).

Looking at the broader group of commercial audits that the CRC performed in six different water districts also provides information about opportunities for water conservation in the business community in the Front Range. Data from all 22 of the audits are presented in Table 2, showing potential water savings by fixture. Across the 22 businesses audited by the CRC within the grant period low-flow faucet aerators were the number one most commonly recommended water fixture upgrade. The high potential water savings calculated for faucet aerators reflects the fact that they were found to be the most prevalent water fixture among all businesses audited. Of the 1,412 faucet aerators encountered, less than 10% met WaterSense standards of 0.5 gpm flow rate for bathroom faucets and the water efficiency standard of 2.0 gpm for kitchen faucets. Due to their prevalence and low costs for replacement and installation, faucet aerators were the most commonly recommended upgrade between all 22 businesses.

Table 2. Potential water savings (kgal) by fixture type, from all 22 audited businesses.

Fixture	Water Savings Potential (kgal)
Faucet Aerator	3,362
Clothes Washer	12
Dishwasher	74
Dual flush toilet	0
Flushometer toilet	100
Food Disposal	131
Ice Machine	6
PRSV	74
Showerhead	1,347
Tank Toilet	2,901
Urinal	1,245
Total Savings Potential	**9,252**

Tank toilets were the next most common fixture encountered and of the 1,065 found, only 9 met or exceeded the WaterSense standard of 1.28 gallons per flush (gpf). We did not recommend upgrades for toilets as often, however, due to the high cost of replacement, that caused payback periods to be much longer than the businesses would be willing to consider. In the future, with the updated reporting format, all fixtures with water conservation potential, but longer payback periods, will be recommended, just designated differently than those that are more cost-effective for the business to pursue.

By industry, faucet aerators and tank toilets were the most ubiquitous of the water fixtures noted. Table 3 details the number of fixtures found, by industry, among the seven different industries audited by the CRC for the CWCB grant. After faucet aerators and tank toilets, urinals and clothes washers were the next most common fixtures, occurring in six of the seven industry types. Dishwashers, PRSVs and showerheads were the third most common

water fixtures, and dual flush toilets, flushometer toilets and food disposals were the least commonly found water fixtures among the industries audited.

Table 3. Quantity of fixtures by industry type. Number in parentheses indicates the quantity of that industry type that was audited by the CRC.

	Industry (Quantity visited)							
Fixture	Elder Care/Living (1)	Hotel (3)	Misc (2)	Office Building (1)	Restaurant (3)	Salon (1)	School (11)	Sum Total
Faucet Aerator	264	685	24	51	25	4	359	1412
Clothes Washer	3	6	2		1	1	5	18
Dishwasher	1	3	2		3		9	18
Dual flush toilet							48	48
Flushometer toilet		10					100	110
Food Disposal			1		1			2
Ice Machine	2	21	1		4		2	30
PRSV	2	7	3		3		12	27
Showerhead	135	669	26			32	21	883
Tank Toilet	173	629	27	28	12	4	192	1065
Urinal		7	7	7	4	1	149	175

Along with the Excel audit tool the CRC requested water records from the City and County of Broomfield for up to 10 years of each business' usage history. The CRC used these records to analyze each business' annual water use as well as any trends occurring in monthly usage. The reports include graphs of monthly and annual usage and provide explanations for the businesses of any trends or instances of high usage that may be indicative of inefficient use and/or a leak. When high seasonal use was apparent from the water records the CRC recommended that the business receive a free Slow the Flow irrigation inspection. Water records indicated that all six of the businesses audited use water to irrigate outdoors.

SURVEY RESULTS

After the report was emailed, a paper copy of the report was mailed to each business along with a Certificate of Participation for the business to display (see example in Appendix B). Finally, a link to an anonymous online survey was sent to each business, asking about each participant's satisfaction, follow-up actions, rebate opportunities used, and any feedback on the report and overall service. Four total surveys were completed from the 22 businesses surveyed. One of the four responses was representative of five of the audits that all occurred within a single school district, making the percentage of surveys responses representative of 36% of those audited. Results for all surveys are presented below.

The first question in the survey asked participants to rate their overall satisfaction with the free water conservation audit. The average response was 4.75 with ¾ of the responses being a 5 and one being a 4 (Figure 1). Next, the survey asked if the participants had performed any of the recommended fixture upgrades or replacements. Only one of the four responses confirmed that they had followed up with one of the recommended upgrades. In the comment section of this question we learned that the

business replaced their showerheads. Another respondent also commented that they "Just got the audit information. Will consider soon," which is positive. The participant that claimed to have upgraded their showerheads also gave the only affirmative response to the next question about whether or not they used any of their utility's rebate options.

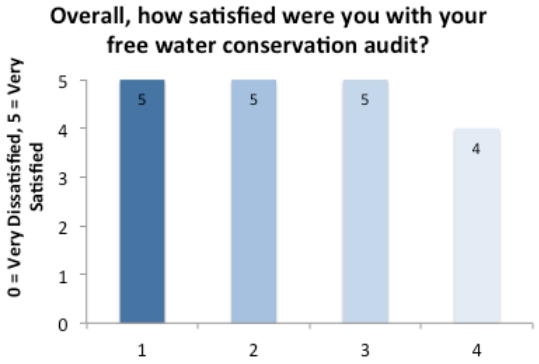


Figure 1. Bar chart of responses to the first survey question, on a scale of 0-5, 0=Very Dissatisfied, 5= Very Satisfied.

The next question addressed participant satisfaction with the report. The average response to this question was 4.67, and was only lower due to the fact that this question was added after one of the participants had submitted a survey (Figure 2). The following question, which included a Yes/No option and comment section, asked whether or not there was anything not covered by the report that should have been included. One respondent answered "yes" to this question, and commented that they would have liked more information on irrigation, and that they felt that their business wasted a lot of water on "non-native grasses."

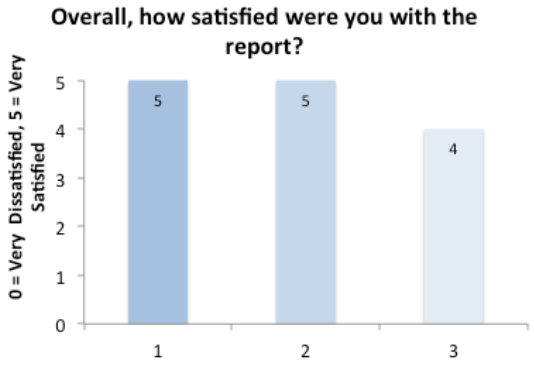


Figure 2. Bar chart of responses to the fifth survey question, on a scale of 0-5, 0 = Very Dissatisfied, 5= Very satisfied.

Our final service-related question asked the business if they would recommend the service to another business. This question got two "yes" responses and one "maybe" response. The fourth, again,

did not have the question in the previous version of the survey. In the comments section of this question one participant wrote "availability of low flow devices is probably not widely known." While this response does not seem to directly pertain to the question under which it was written, it does tell us that at least one of the respondents did not feel that there was sufficient knowledge in the business community of where to purchase high efficiency water conservation fixtures. This is valuable feedback that will be taken into account and addressed in future reporting efforts.

The last two questions asked the business to report from which industry they were from – all three that had the question when they took the survey were from the School/Education/Child care industry. And two of these three left the name of their business – Holy Family High School and Adams 12 Five Start Schools, from Broomfield and Thornton water districts. In the future we hope to receive more feedback from a broader range of businesses as we continue to try to make the audits useful for many different industries.

CONCLUSIONS

Through the direct support and efforts from the City and County of Broomfield and a grant from the CWCB the CRC was able to complete six commercial audits for the City and County. These audits revealed water savings potential within all businesses audited. Notable water savings opportunities exist in the City and County of Broomfield through the upgrade of faucet aerators and PRSVs. Other water savings opportunities exist for urinals, showerheads, and clothes washers. Data from all 22 audits performed by the CRC under the grant support the findings in the City and County of Broomfield. The CRC recommends that Broomfield consider programs and rebate opportunities that support upgrades for those devices that either offer the highest water savings potential and/or that provide incentives for fixtures that may be cost prohibitive to replace for the commercial industry. Survey results show high satisfaction with the service, but a lack of implementation actions after the audit. The CRC is already working to update the report in order to increase it's effectiveness at providing support and inspiration to follow the recommendations we offer.

APPENDIX A

Water Conservation Report for Broomfield High School

Water Conservation Report for Aloft Hotel

Water Conservation Report for Omni Interlocken Resort

Water Conservation Report for Beautiful Savior Lutheran School

Water Conservation Report for Holy Family High School

Water Conservation Report for Broomfield Academy

WATER CONSERVATION Audit Report

Broomfield High School

Performed by:

With support from:

Based on our flow measurements and analysis we believe that Broomfield High School is using water in a responsible manner. This report provides more information on water conservation opportunities at Broomfield High School as well as estimations of the potential savings and cost effectiveness of these opportunities. The report also describes financial incentives that may be available to help reduce costs of potential upgrades.

Water Conservation Audit Report

Broomfield High School

Upgrade Opportunities

Based on discussions with the facility manager and staff, and from reviewing Broomfield High School's (BHS) water usage records it appears that water use for bathrooms is the largest category of use at BHS. However, during the audit we found all bathroom fixtures to be operating within the EPA WaterSense efficiency threshold of 1.28 gpf for toilets, 1.0 gpf for urinals, and 1.0 gpm for faucets. This finding included the pre-1992 urinals, which were not created to meet a "low-flow" standard, but appear to meet this standard based on a representative test in several restrooms.

Minor water savings could be achieved by replacing the pre-rinse spray valve (PRSV) in BHS's kitchen. We were unable to replace this fixture during our visit on 1/2/14 due to differences in size of the attachment of the fixture. For information on where to purchase a new, high-efficiency PRSV, please contact the CRC.

Since all of the toilets in BHS are the dual-flush "Uppercut" flushometer models, the water saving potential is already at a maximum; however, several times during the audit our team noticed that the stickers with instruction on the proper use of the toilets were improperly oriented. To ensure maximum results from these high efficiency toilets all labels should be checked and fixed when necessary.

The CRC recommends the replacement of one PRSV to achieve cost-effective water use reductions at BHS. Replacing the current urinals with higher-efficiency versions would also save a significant amount of water for BHS, however the payback period for this upgrade is not optimal (Table 1), making this change less beneficial monetarily for the school. We have contacted the City and County

Water Use

Water use per student at Broomfield High School has decreased steadily since 2007, when each student used roughly 9.3 gallons per school day. The latest complete data from 2012 showed that each student uses roughly 4.8 gallons per school day. That's a 48% reduction!

of Broomfield to determine if any further rebates or incentives might be available to reduce or eliminate the cost of this proposed water efficiency upgrades. These rebates are included in Table 1.

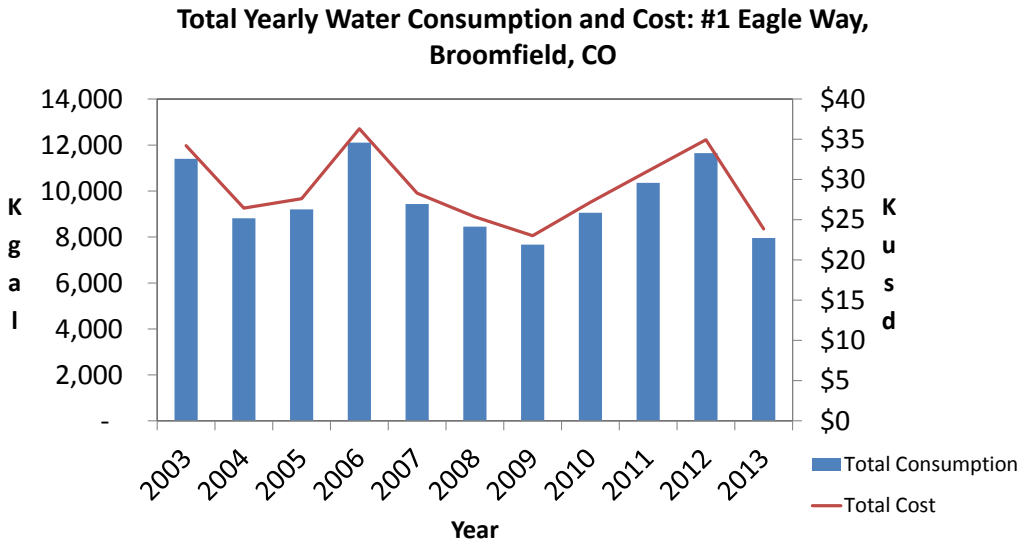


Figure 1. Total yearly water consumption and cost since 2003 for Broomfield High School.

Table 1 shows the estimated costs and savings associated with all potential water efficiency upgrades considered for BHS. Urinal upgrades are included for informational purposes.

Table 1.

CII Water Assessment Tool - Results **Broomfield High School** **v 1.2**

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	0	0	0	0	$0	$0	$0	$0	$0	$0		no	43
Pre-rinse spray valve	1	3	0	7	$15	$0	$9	$24	$75	$150	3.1	yes	8
Toilet	0	0	-	-	$0	-	-	$0	$0	$0		no	158
Urinal	27	41	-	-	$190	-	-	$190	$2,700	$16,200	71.1	yes	81
Showerhead	0	0	0	0	$0	$0	$0	$0	-	$0		no	0
Clothes washer	0		0	0	-	$0	$0	$0	-	$0		no	0
Dishwasher (residential)	0		0	0	-	$0	$0	$0	-	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	-	$0		no	50
Ice machine	0	0	0	0	$0	$0	$0	$0	-	$0		no	0
Steam cooker	0	0	0	0	$0	$0	$0	$0	-	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	-			no	0
Cooling tower	0	0	-	-	$0	-	-	$0	-	$0		no	
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	
Total of All Measures		**44**	**0**	**7**	**$205**	**$0**	**$9**	**$214**	**$2,775**	**$16,350**	**63.4**		
Total of Included Measures		**44**	**0**	**7**	**$205**	**$0**	**$9**	**$214**	**$2,775**	**$16,350**	**63.4**		

Sanitary Fixture and Laundry Fraction (30-50% typ) 4%
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants) 1%

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.

Table 2 summarizes the potential cost savings and estimates the rebate level that might be available from the City and County of Broomfield

Table 2.

City of Boulder Water Conservation Assessment Report

Broomfield High Primary Contact: Jeff Medwetz

Broomfield, CO 80020

Potential opportunites for water and cost savings	Qty.
Pre-rinse spray valve	1
Urinal	27

Annual Savings*	Resource	Cost
Water	43,700 gallons	$200
Electricity	0 kWh	$0
Natural Gas	10 therms	$10
Total Savings	-	**$210**
Installed Cost**		$16,400
Potential Rebate***		$2,800
Simple Payback		**63.4 years**

Figure 2 shows the estimated water and energy savings associated with each proposed upgrades.

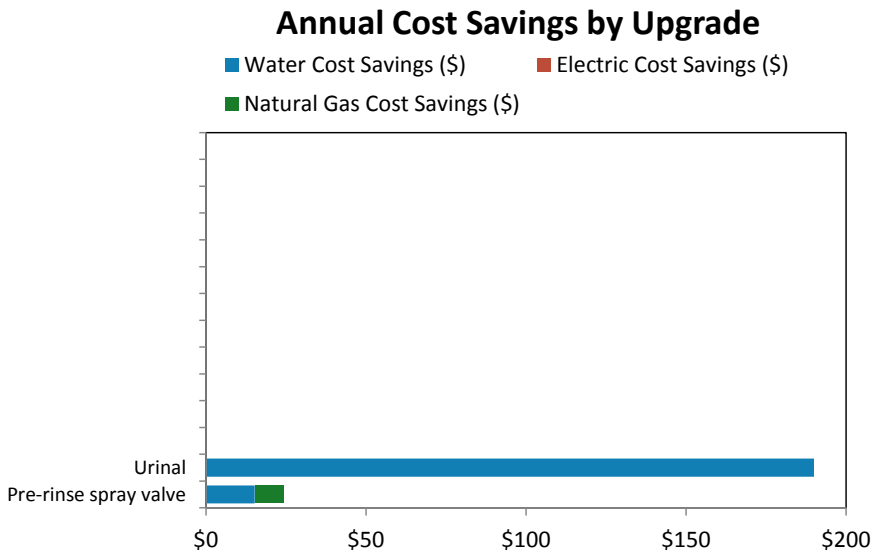


Figure 2. Annual cost savings from pre-rinse spray valve and urinal upgrades for water, electric, and natural gas costs.

Best Management Practices

In addition to upgrading equipment, BHS can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that businesses implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

Rebates Available

The City and County of Broomfield is offering a $75 per-toilet rebate to commercial customers who install EPA WaterSense-labeled, high-efficiency toilets that use an average of 1.28 gallons per flush (gpf) or less, and a preapproval is required for rebate amount of more than $2,500 (34 or more toilets).

Broomfield is also offering a urinal rebate program. The high-efficiency urinal rebate program offers a rebate of $100 per urinal installed, which flushes 0.5 gallons per flush (gpf) or less. Only EPA WaterSense-labeled, high-efficiency urinals are eligible. Preapproval is required for rebate amount of more than $2,500 (26 or more urinals).

Next Steps

When we spoke to Jeff Medwetz, the Project Manager for Energy Systems at Boulder Valley School District, one issue the he brought up was that utility billing is being handled by accounts payable, and there is no opportunity for those in charge of the facilities to review consumption. It was his hope that Boulder Valley School District could adopt a review process that would allow for the identification of a of water consumption, which could then be used to help spot leaks or other issues. We also encourage this step.

Another service that the Center for ReSource Conservation offers, and one that BHS may find beneficial, is the “Slow the Flow” sprinkler inspection program. This program would work with the grounds management team to evaluate the current sprinkler system’s health and the needs of the landscape. While it is our understanding that BHS’s irrigation system is centrally controlled, there may still be water-savings that we could identify.

WATER CONSERVATION Audit Report

Aloft Hotel, Broomfield, CO

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

CITY AND COUNTY OF BROOMFIELD • COLORADO •

SUMMARY: Based on our flow measurements and analysis we believe that Aloft Hotel could cost-effectively reduce water use without sacrificing performance by replacing all faucet aerators and four urinals. There is up to a $400 rebate potential available to the Aloft Hotel to help reduce project cots. This report provides more information on these and other water conservation opportunities at Aloft Hotel as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Aloft Hotel, Broomfield, CO

Audit conducted April 18, 2014 by the Center for ReSource Conservation

The Site

Aloft Hotel is located at 8300 Arista Place, Broomfield, CO. It has 139 guest rooms and an average occupancy rate of 69%. The hotel was first constructed in 2009 and the kitchen was remodeled in 2012. The interior of the building covers approximately 78,000 ft². Running along the road outside, Aloft Hotel has roughly 1,250 ft² of irrigated turf. The hotel maintains a single indoor pool that holds 15,000 gallons of water. Laundry is done on-site in two commercial machines located in the basement, and two residential machines located on the top floor. There is also a small bar, which is open nightly. The kitchen contains three pre-rinse spray valves, a dishwasher, two hand wash sinks and two icemakers. In the lobby and conference area there are two men's and two women's restrooms, as well as an employee restroom. Between these five facilities, there are four urinals, eleven faucets, and ten toilets.

Water Use

Figure 1 displays the monthly water use since January of 2012 at Aloft Hotel. The chart shows the typical water usage pattern in Colorado with increased water use in the summer months when outdoor watering and pool use occurs. We recommend comparing Aloft's monthly water bill to this figure on a regular basis in order to assess if the hotel's water use is within the expected range of 100-500 thousand gallons per month. Summer use above 500 thousand gallons or winter use higher than 300 thousand gallons may be indication of a significant leak.

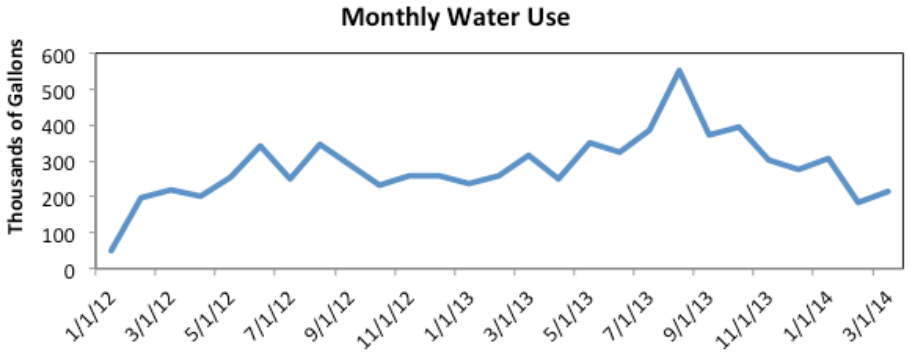


Figure 1

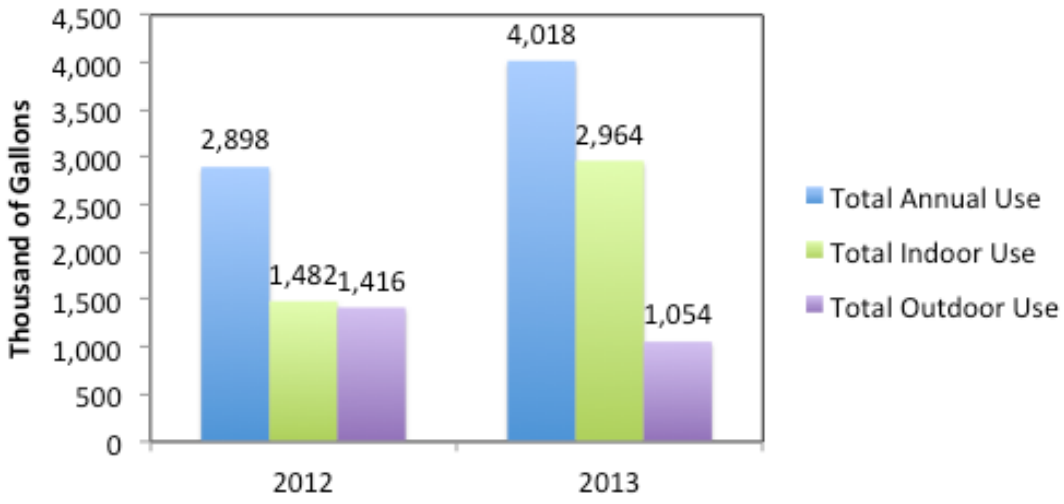


Figure 2

Figure 2 shows the Aloft Hotel's Total Annual Use in 2012 and 2013 along with the estimated Total Indoor and Outdoor Use in thousands of gallons. Total Indoor Use was estimated using the average of January and February use, when outdoor watering does not typically occur in Colorado, multiplied by 12 for the months in the year. The difference between the Total Annual Use and the Total Indoor Use equals the Total Outdoor Use. Interestingly, Aloft Hotel's Total Annual Use increased between 2012 and 2013 by 39%, however Total Outdoor Use decreased by 26% during this same time period. Total Indoor Use appears to be the largest driver for the increase in Total Annual Use, with a 100% increase over the previous year. Therefore, upgrading indoor fixtures with high-efficiency models could have a large benefit to the overall water use at Aloft Hotel.

Upgrade Opportunities

From the representative sample of guest room bathroom faucet aerators tested during the audit, the current flow rate was found to be 2.0 gallons per minute (gpm). The kitchen faucet aerators were found to have a flow rate of 4.0 gpm. These flow rates are above the current EPA WaterSense[1] specification and therefore **we recommend adding low-flow faucet aerators that limit flow to a maximum of 0.5 gpm flow rate at all of your guest room bathroom sinks and 1.5 gpm at all kitchen sinks.** Table 1 details these estimated savings and payback periods. Beyond water savings, upgrading faucets with low-flow aerators will save a significant amount of hot water, which in turn will produce cost savings on the hotel's natural gas bill as well. **We estimate cost savings from making this upgrade to be approximately $930 per year with an estimated payback time of 1.5 years or less.**

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

Another cost-effective upgrade for the Aloft Hotel is to replace all restroom urinals. During the audit we found that the current restroom urinals use 1 gallon per flush (gpf). All EPA WaterSense urinals use 0.5 gpf, and are tested against industry standards for durability and functionality. **Replacing the four urinals could save the hotel $260 per year**. Furthermore, the City and County of Broomfield is offering a $100 rebate on all WaterSense urinals, lowering project costs. Please see Broomfield's website (www.broomfield.org) for more information.

The third cost-effective upgrade opportunity for the Aloft Hotel is the single ice-making head ice machine. This type of icemaker contains the ice-making mechanism and condenser in the same unit, with a removable ice storage bin. We recommend that when replacing the current unit, Aloft upgrade to an air-cooled ENERGY STAR[2] icemaker. **This replacement has the potential to save Aloft Hotel $144 per year**. If feasible, consider selecting a nugget or flake-producing icemaker, which use less water and energy than cubed ice machines. If replacement is not feasible, use the EPA's WaterSense website to educate your staff on the recommended icemaker operation and maintenance guidelines to ensure that all ice machines are performing at the optimal level.

[2] ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals save money and protect the climate through energy efficiency measures. For more information, including third-party certified product information, please go to www.energystar.gov

Table 1

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	141	122	0	254	$747	$0	$183	$930	$0	$1,420	1.5	yes	168
Pre-rinse spray valve	0	-10	0	-21	-$60	$0	-$15	-$75	$0	$0	0.0	no	16
Toilet	139	45	-	-	$276	-	-	$276	$10,425	$83,400	264.8	no	238
Urinal	4	42	-	-	$260	-	-	$260	$400	$2,400	7.7	yes	85
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no	566
Clothes washer	0	0	0	0	$0	$0	$0	$0	$0	$0		no	9
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	91
Ice machine	1	6	1,112	0	$38	$100	$0	$138	$0	$0	0.0	yes	104
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Total of All Measures		**206**	**1,112**	**234**	**$1,260**	**$100**	**$168**	**$1,528**	**$10,825**	**$87,220**	**50.0**		
Total of Included Measures		**171**	**1,112**	**254**	**$1,045**	**$100**	**$183**	**$1,328**	**$400**	**$3,820**	**2.6**		

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ)	31%
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants)	6%

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the stated fixtures with the high-efficiency models detailed above. This Installed Cost estimate was created with the assumption that at the future time of icemaker replacement, the incremental cost for purchasing an ENERGY STAR icemaker unit will be $0.

Table 2

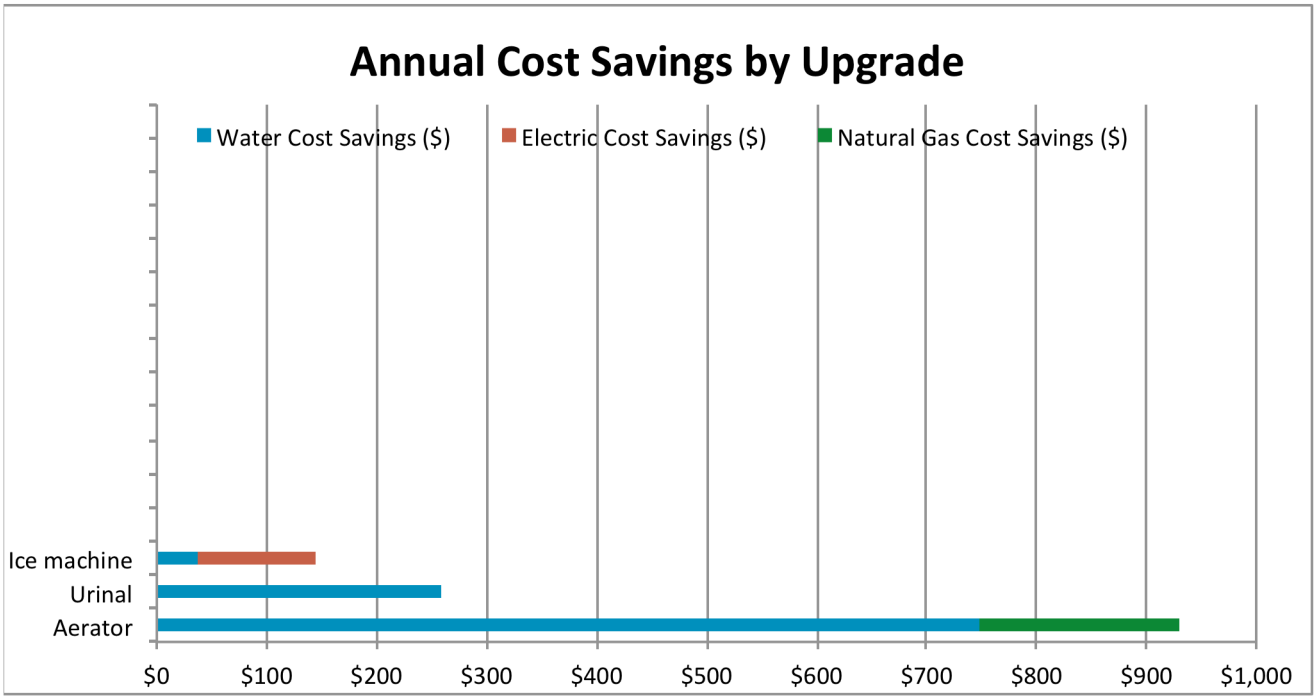
City of Broomfield Water Conservation Assessment Report

Aloft Hotel Primary Contact: Ryan Ikemeire
8300 Arista Pl
Broomfield, CO 80021

Potential opportunites for water and cost savings	Qty.
Aerator	141
Urinal	4
Ice machine	1

Annual Savings*	Resource		Cost	
Water	170,700	gallons	$1,000	
Electricity	1,100	kWh	$100	
Natural Gas	250	therms	$180	
Total Savings	-		**$1,280**	
Installed Cost**			$3,800	
Potential Rebate***			$400	+
Simple Payback			**2.6**	**years**

Figure 3 shows the estimated water, electricity and natural gas savings associated with each proposed upgrade. Only minimal electricity and natural gas benefits are anticipated from these upgrades, but the water savings appear substantial.



* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.

** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.

***Rebates are set by the water utility and will vary by utility.

Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.

- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Aloft Hotel will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where your business can purchase the most efficient and cost-effective fixtures and appliances. For hotel-specific information, webinars and Best Management Practices use the new H_2Otel Challenge web portal. Furthermore, if Aloft Hotel is interested in voluntarily participating in the H_2Otel Challenge, this audit can be directly applied to the "Assess" step of the program.

The Center for ReSource Conservation as well as your water provider, The City and County of Broomfield, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3824 and ask to speak with our Water Conservation Technician. To contact the City and County of Broomfield's water department, you can visit to their website, broomfield.org, or call 303-438-6363.

WATER CONSERVATION Audit Report

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

CITY AND COUNTY OF BROOMFIELD • COLORADO •

SUMMARY: Based on our flow measurements and analysis we believe that the Omni Interlocken Hotel could cost-effectively reduce water use without sacrificing performance by replacing all guest room showerheads and faucet aerators, and the kitchen pre-rinse spray valves. This report provides more information on these and other water conservation opportunities at Omni Hotel as well as estimations of potential savings and cost effectiveness of these opportunities. The report also describes financial incentives that may be available to help reduce project costs.

Water Conservation Audit Report

Audit conducted April 21, 2014 by the Center for ReSource Conservation.

The Site

Omni Interlocken Hotel is located at 500 Interlocken Loop, Broomfield, CO. It has 390 guest rooms which are generally occupied by two people. On average, 63% of the rooms at Omni Interlocken are filled at any given time. The hotel was first constructed in 1999 and there have been no major renovation since. The interior of the building covers approximately 480,000 ft^2. The hotel maintains two pools and a hot tub. The larger pool holds 55,000 gallons, while the smaller holds 30,000 gallons. The hot tub holds roughly 3,000 gallons. Laundry is done on-site in four commercial machines located in the basement. Attached to the lobby area are two restaurants and a bar; all of these restaurants use one central kitchen. The kitchen contains two pre-rinse spray valves, a high-temperature single tank conveyor dishwasher, three hand wash sinks and two ice makers. In the lobby and conference area there are two men's and two women's restrooms. Between the 390 guest rooms, as well as the restroom facilities in the lobby, there are six urinals, 406 faucets, and 402 toilets. Outside, Omni Interlocken maintains a 27-hole golf course as well as extensive landscaping surrounding the hotel. The City and County of Broomfield supply the Omni Interlocken Hotel with reclaimed water for their golf course use. Neither the golf course, nor the landscaping were included in the audit.

Water Use

The Omni Interlocken Hotel receives and pays monthly water bills for six separate water meters. Figure 1 displays the monthly water use, in thousands of gallons, by meter (each meter is labeled as a separate account number, i.e. 96610802). Meter 96610800 peaks in the summer months, suggesting that it supplies a significant proportion of the landscape and golf course irrigation water, and stays high in the winter, indicating that it also supplies a significant portion of indoor water as well. Meter 96610804 has several irregularly spaced peaks, possibly reflecting large leak occurrences. We recommend comparing your monthly water bills to the range of values displayed in this graph, for each meter. If the current bill shows a number that is higher or lower than what you might expect for that meter at

that time of the year, it should be investigated to ensure that no major leaks are occurring. For meter 96610804, we recommend investigating any usage above 1,000 thousand gallons.

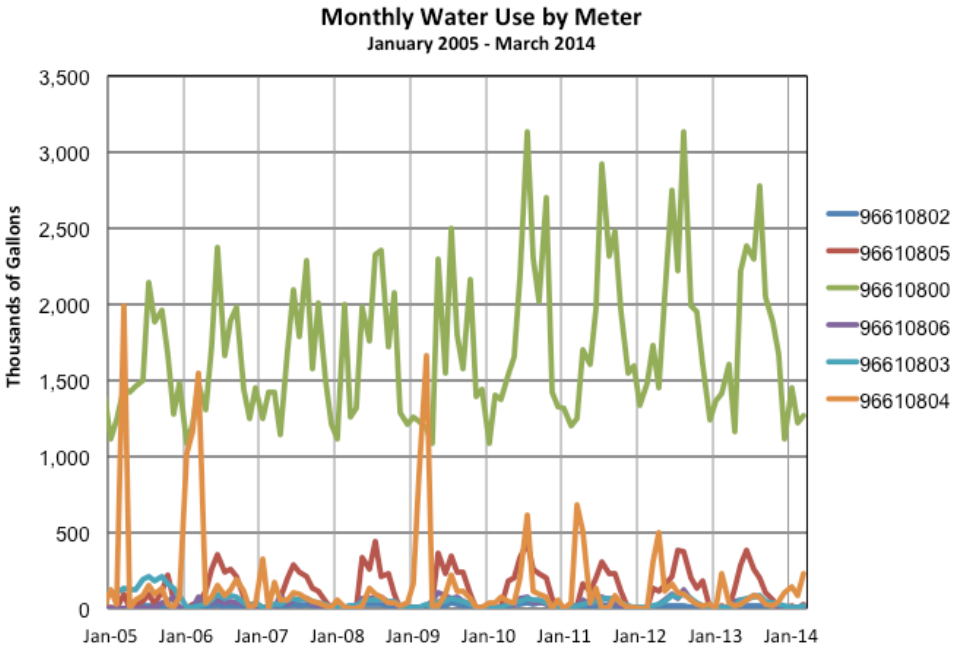


Figure 1

Figure 2 shows the Total Annual Use, as the cumulative of outdoor and indoor water use. Indoor Use is estimated using the average of December, January, and February use, when outdoor watering does not typically occur in Colorado, multiplied by 12 for the months in the year. The difference between the Total Annual Use and Indoor Use equals the Outdoor Use. This chart reveals that proportionately, Outdoor Use has grown while Indoor Use has decreased at the Omni Interlocken Hotel. On average, 73% of the hotel's water use is Indoor Use while 27% is Outdoor Use, however since 2010, Outdoor Use has been above 30% of the hotel's Total Annual Use.

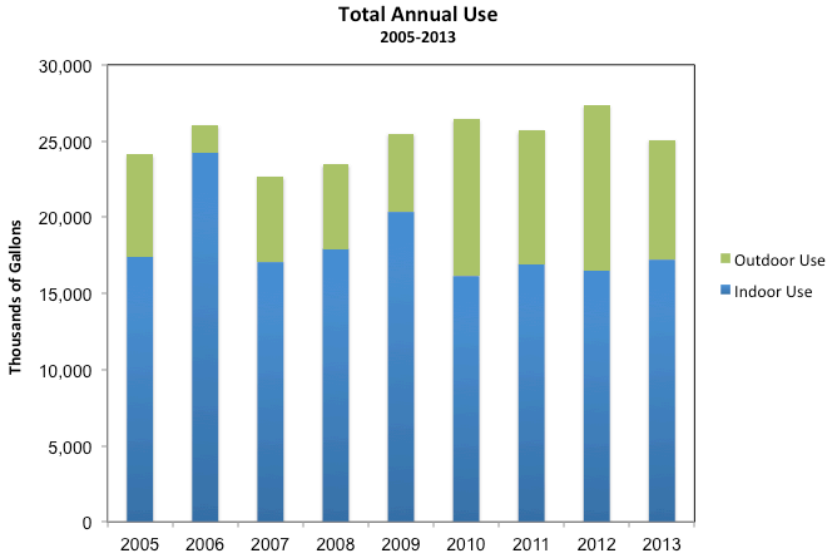


Figure 2

Upgrade Opportunities

Low-flow showerheads are a device that will provide Omni Interlocken Hotel with significant water and natural gas savings. From the representative sample that we took, the current showerheads had a measured flow rate of 2.5 gallons per minute (gpm). **We recommend adding WaterSense[1] labeled low-flow showerheads that limit flow to a maximum of 2.0 gpm flow rate at all of your guest room showers.** Showerheads carrying the WaterSense label have been performance tested to ensure a satisfactory experience as well as water and energy savings. Increasing shower efficiency with WaterSense labeled showerheads is expected to save a significant amount of hot water, which in turn will produce cost savings on the hotel's natural gas bill. **We estimate cost savings from making this upgrade to be approximately $4,233 per year and full cost recovery will occur in 1.8 years.** Table 1 details these estimated savings and calculated payback periods.

Low-flow faucet aerators are another device that can provide Omni Interlocken Hotel with significant water and natural gas savings. From the representative sample that we examined, the current bathroom faucets have a measured flow rate of 1.5 gpm. **Without sacrificing performance, the Omni Interlocken Hotel could add low-flow faucet aerators that limit flow to a maximum of 0.5 gpm flow rate at all guest room bathroom sinks.** Beyond water savings, upgrading faucets with low-flow aerators will save a significant amount of hot water, which in turn will produce cost savings on the hotel's natural gas bill. **We estimate cost savings from making this upgrade to be approximately $3,511 per year and full cost recovery will occur in 1.1 years.**

Pre-rinse spray valves are another device that will provide Omni Interlocken Hotel with water and natural gas savings. The two pre-rinse spray valves measured both had flow rates of 2.0 gpm. This flow rate exceeds the current EPA WaterSense specification and therefore **we recommend replacing these with pre-rinse spray valves with maximum flows of 1.14 gpm. We estimate the savings from this upgrade to be $72 per year and full cost recovery will occur in 2.8 years.**

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

Table 1

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	1	2	0	5	$14	$0	$4	$18	$0	$100	5.6	no	4
Aerator	390	461	0	960	$2,820	$0	$691	$3,511	$0	$3,900	1.1	yes	691
Pre-rinse spray valve	2	9	0	20	$58	$0	$14	$72	$0	$200	2.8	yes	22
Toilet	390	246	-	-	$1,508	-	-	$1,508	$29,250	$234,000	135.8	no	1,232
Urinal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Showerhead	390	556	0	1,157	$3,400	$0	$833	$4,233	$0	$7,800	1.8	yes	2,778
Clothes washer	0	0	0	0	$0	$0	$0	$0	$0	$0		no	18
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	91
Ice machine	0	0	0	0	$0	$0	$0	$0	$0	$0		no	680
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Total of All Measures		**1274**	**0**	**2,141**	**$7,800**	**$0**	**$1,542**	**$9,341**	**$29,250**	**$246,000**	**23.2**		
Total of Included Measures		**1026**	**0**	**2,136**	**$6,278**	**$0**	**$1,538**	**$7,816**	**$0**	**$11,900**	**1.5**		

Table 2 summarizes the potential cost savings realized from replacing the stated fixtures with the high-efficiency models detailed above. It is important to note that these estimates are conservative (i.e. water and cost savings are likely underestimated).

Table 2

City of Broomfield Water Conservation Assessment Report

Omni Interlocken Primary Contact: Mike Davis
500 Interlocken Bl\
Broomfield, CO 80021

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	390
Pre-rinse spray valve	2
Showerhead	390

Annual Savings*	Resource		Cost
Water	1,025,700	gallons	$6,300
Electricity	0	kWh	$0
Natural Gas	2,140	therms	$1,540
Total Savings	-		**$7,840**
Installed Cost**			$11,900
Potential Rebate***			$0
Simple Payback			**1.5 years**

Figure 3 shows the estimated water and energy savings associated with each proposed upgrade. While the savings from water will be substantial, roughly 20% of the total savings will come from natural gas savings.

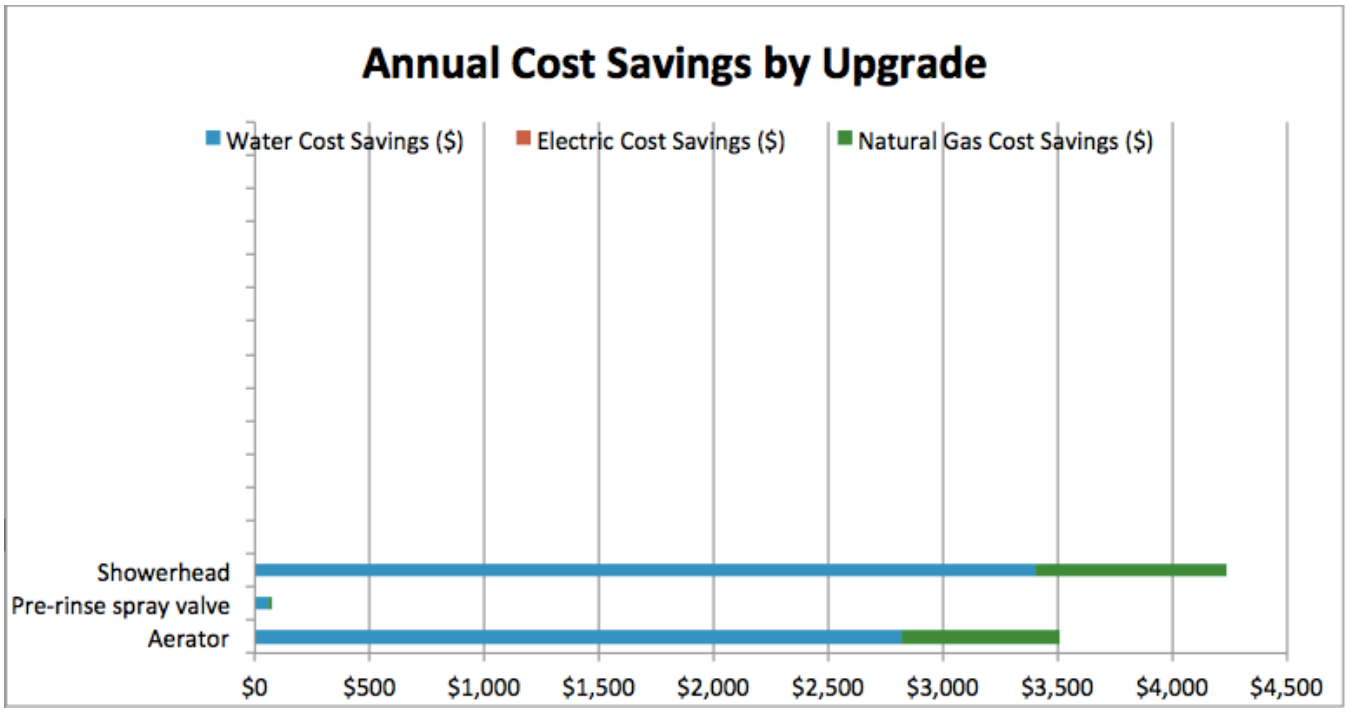


Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Omni Interlocken Hotel will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where your business can purchase the most efficient and cost-effective fixtures and appliances. For hotel-specific information, webinars and Best Management Practices use the new H_2Otel Challenge web portal. Furthermore, if Omni Hotel is interested in voluntarily participating in the H_2Otel Challenge, this audit can be directly applied to the "Assess" step of the program.

The Center for ReSource Conservation as well as your water provider, The City and County of Broomfield, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3824 and ask to speak with our Water Conservation Technician. To contact the City and County of Broomfield's water department, you can visit to their website, broomfield.org, or call 303-438-6363.

WATER CONSERVATION Audit Report

Holy Family High School, Broomfield, CO

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

CITY AND COUNTY OF BROOMFIELD • COLORADO •

SUMMARY: Based on our flow measurements and analysis we believe that Holy Family High School could cost-effectively reduce water use without sacrificing performance by adding low-flow faucet aerators to all restroom and kitchen sinks. This report provides more information on these and other water conservation opportunities at Holy Family High School as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Holy Family High School, Broomfield, CO

Audit conducted May 5, 2014 by the Center for ReSource Conservation

The Site

Holy Family High School is located at 5195 West 144th Ave. in Broomfield, Colorado. The school offers classes for 9th-12th grade, with 625 students enrolled during the 2013-2014 school year. During the audit the water fixtures encountered included 42 flushometer toilets, 15 urinals, 43 bathroom faucets, 16 showerheads, and a kitchen with 2 kitchen faucets and one pre-rinse spray valve. Outdoor watering does occur at the high school, however this audit was focused on indoor water use and therefore this report will only address indoor water conservation opportunities.

Water Use

Figure 1 displays Holy Family High School's Monthly Water Use between January 2006 and April 2014. Water usage at Holy Family High School ranged between 10 and 130 thousand gallons per month during this time period. **We recommend checking water bills monthly, comparing each water bill to this chart, and if a single month has usage higher than 120 thousand gallons of water, checking for leaks that may be causing use to be above the expected range.** Outdoor water use, occurring predominantly from May-September in Colorado, does not appear to be a large contributor to water use at the school, however this may be due the school having separate indoor and outdoor meters.

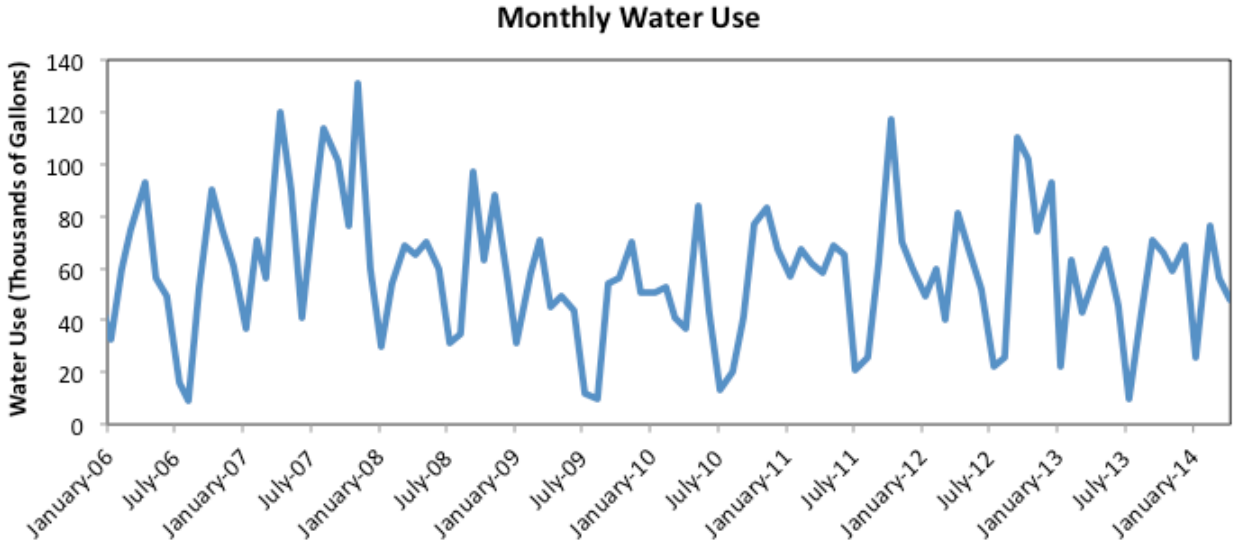


Figure 1

Figure 2 shows Holy Family's Total Annual Use for 2006-2013. Over this time period Holy Family High School has used an average of 707 thousand gallons per year. Based on this data, Holy Family uses an average of 1.21 thousand gallons per year per student. Compared to other high schools in Colorado, this is below average. While these numbers may not include the outdoor water use at the school, it is commendable that the school has such low per student usage.

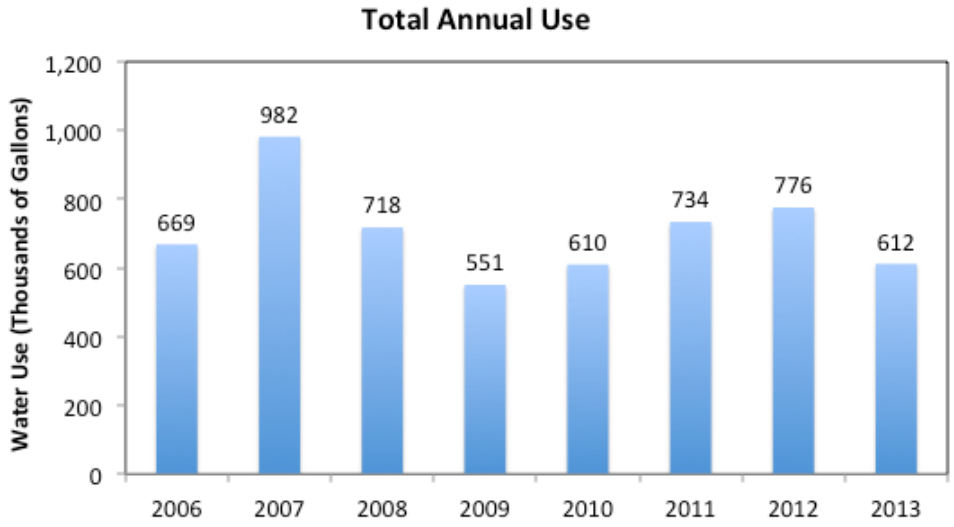


Figure 2

Upgrade Opportunities

Even with low per-student usage, water conservation opportunities were still identified during the audit. From direct measurement of faucet aerators, we found flow rates of 2 gallons per minute (gpm) in all restroom sinks and 3 gpm in kitchen sinks. These flow rates are above the current EPA WaterSense[1] specification and therefore **we recommend adding low-flow faucet aerators that limit flow to a maximum of 0.5 gpm at all restroom sinks and 1.5 gpm at the kitchen sinks.** Table 1 details the estimated savings and payback periods for this upgrade. Beyond water savings, upgrading faucets with low-flow aerators will save a significant amount of hot water, which in turn will produce cost savings on the school's natural gas bill as well. **We estimate cost savings from making this upgrade to be approximately $2,140 per year with an estimated payback time of 0.2 years.**

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

We also identified a potential water, energy, and cost savings through the replacement of the school's clothes washer. We recommend that at the time of replacement that the school purchases an ENERGY STAR[2] certified washer. When replaced, an ENERGY STAR clothes washer is expected to provide an annual cost savings of $54 over the current washing machine.

The toilets and urinals at Holy Family High School are relatively efficient, however when these fixtures need replacement, we also recommend purchasing WaterSense labeled toilets and urinals. Table 1 details the potential cost savings of replacing all toilets with 1.28 gallons per flush (gpf) models and urinals with 0.5 gpf models. Furthermore, the City and County of Broomfield currently offers a $75 and $100 rebate on all WaterSense labeled toilets and urinals, respectively, which may help to lower project costs. Please see Broomfield's website (www.broomfield.org) for more information.

[2] ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals save money and protect the climate through energy efficiency measures. For more information, including third-party certified product information, please go to www.energystar.gov

Table 1

CII Water Assessment Tool - Results **Holy Family High School** **v 1.4**

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	45	281	0	585	$1,718	$0	$421	$2,140	$0	$460	0.2	yes	383
Pre-rinse spray valve	0	0	0	0	$0	$0	$0	$0	$0	$0		no	3
Toilet	42	100	-	-	$611	-	-	$611	$3,150	$25,200	36.1	no	499
Urinal	15	88	-	-	$537	-	-	$537	$1,500	$9,000	14.0	no	176
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no	45
Clothes washer	1	6	50	15	$38	$4	$11	$54	$0	$150	2.8	yes	11
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	50
Ice machine	0	0	0	0	$0	$0	$0	$0	$0	$0		no	9
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Total of All Measures		**475**	**50**	**600**	**$2,905**	**$4**	**$432**	**$3,341**	**$4,650**	**$34,810**	**9.0**		
Total of Included Measures		**287**	**50**	**600**	**$1,757**	**$4**	**$432**	**$2,193**	**$0**	**$610**	**0.3**		

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ)	157%
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants)	9%

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the faucet aerators and the clothes washer with the high-efficiency models detailed above.

Table 2

City of Broomfield Water Conservation Assessment Report

Holy Family High S Primary Contact: Matthew Mondrangon
5195 W 144th Ave matthew.mondrango@holyfamilyhs.com
Broomfield, CO 80023

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	45
Clothes washer	1

Annual Savings*	Resource		Cost	
Water	287,000	gallons	$1,800	
Electricity	0	kWh	$0	
Natural Gas	600	therms	$430	
Total Savings	-		**$2,230**	
Installed Cost**			$600	
Potential Rebate***			$0	+
Simple Payback			**0.3**	**years**

Figure 3 shows the estimated water, electricity and natural gas savings associated with each proposed upgrade. Only minimal natural gas benefits are anticipated from these upgrades, but the water savings appear substantial.

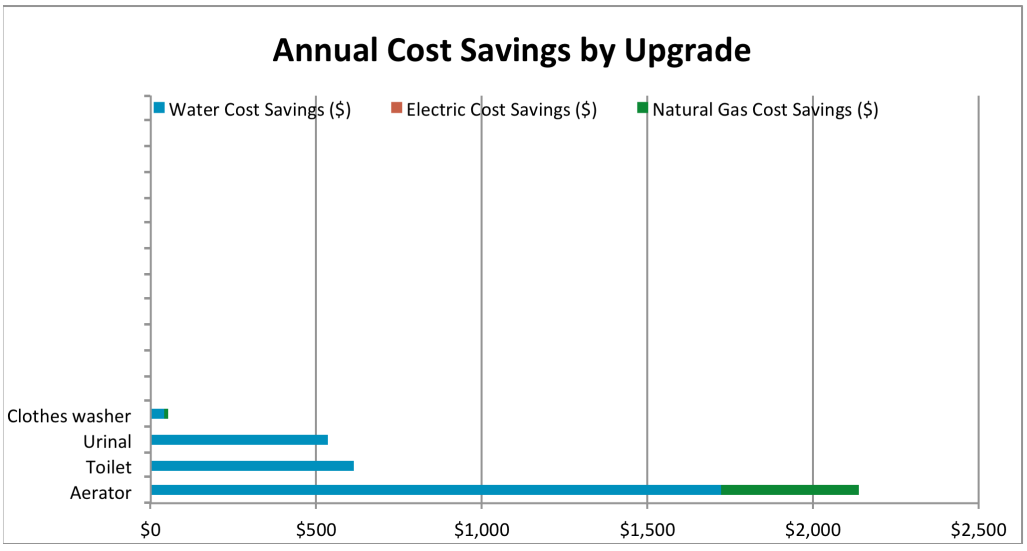


Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that businesses implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Holy Family High School will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where the school can purchase the most efficient and cost-effective fixtures and appliances.

The Center for ReSource Conservation as well as your water provider, The City and County of Broomfield, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3820, ext. 224. To contact the City and County of Broomfield's water department, you can visit to their website, broomfield.org, or call 303-438-6363.

WATER CONSERVATION Audit Report

Beautiful Savior Lutheran School

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

CITY AND COUNTY OF BROOMFIELD • COLORADO •

SUMMARY: Based on our flow measurements and analysis we believe that Beautiful Savior Lutheran School could cost-effectively reduce water use without sacrificing performance by replacing all faucet aerators and pre-rinse spray valves. This report provides more information on these and other water conservation opportunities at Beautiful Savior as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Beautiful Savior Lutheran School

Audit conducted April 23, 2014 by the Center for ReSource Conservation

The Site

Beautiful Savior Lutheran School is located at 6995 W. 120th Avenue, Broomfield, CO. Built in 1958 and expanded in 1970 and 2005, Beautiful Savior's building covers an area of roughly 40,000 ft², and contains a sanctuary, gymnasium, kitchen, "Early Learning Center," and K-8 school. This year, Beautiful Savior has ninety-six students enrolled in its schools, and has an average Sunday attendance of 130 people. The building maintains several men's and women's restrooms, which contain a total of twenty-three toilets, three urinals, and twenty-eight faucets. In the kitchen, Beautiful Savior has one dish washer and one pre-rinse spray valve; however, these appliances are rarely used, since paper plates are primarily used during meals.

Water Use

Beautiful Savior's average monthly water usage is 29,000 gallons. Figure 1 displays monthly water use from 2005 through February of 2014. The pattern in the water use, with higher usage in the summer and lower usage in the winter, is typical due to outdoor watering that occurs in the summer months.

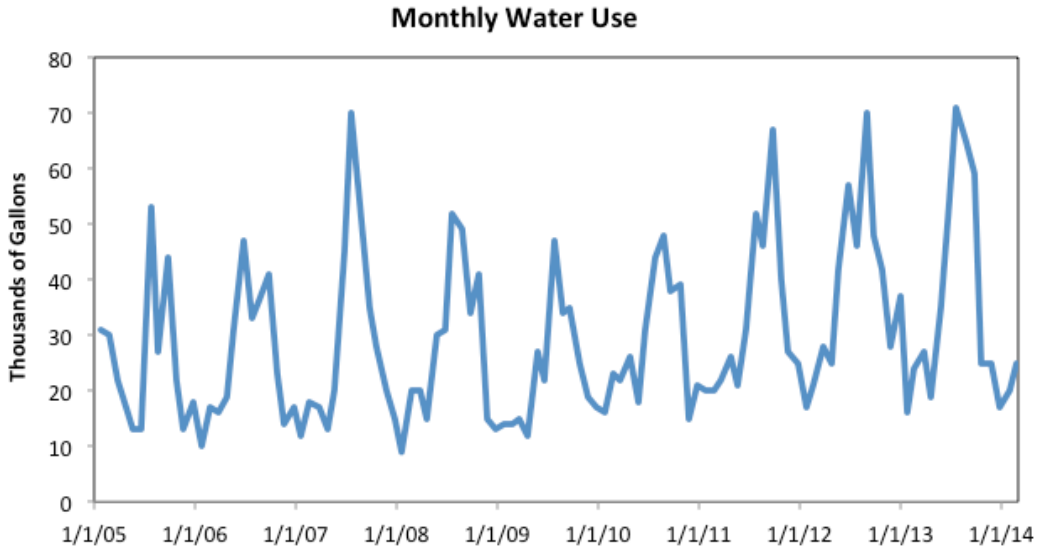


Figure 1

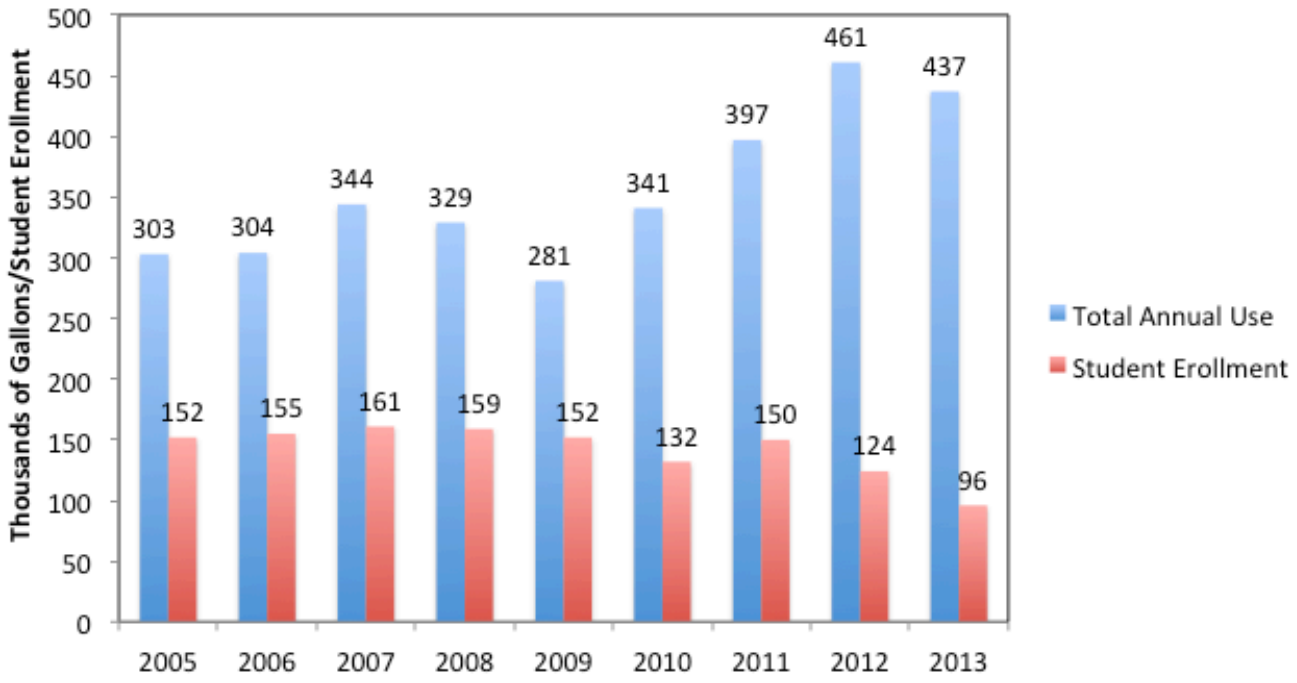


Figure 2

Figure 2 displays the Total Annual Use, in thousands of gallons, along with the student enrollment data from 2005-2013. While student enrollment has dropped some over this time period, water use has increased, indicating that there may be some inefficiencies affecting the school's water infrastructure or fixtures. Another reason for the increased use may also be related to outdoor watering. While it is not possible to separate outdoor from indoor use given the single meter for the entire school, the data in Figure 1 does show that 2011, 2012, and 2013 had significantly higher water use than in pervious years.

Upgrade Opportunities

During the audit it was determined that four of the faucet aerators were using 2.0 gallons per minute (gpm). This flow rate is higher than the current EPA WaterSense[1] specification. **A significant water savings could be achieved by replacing all faucet aerators with 0.5 gpm aerators.** Beyond water savings, upgrading faucets with low-flow aerators will save hot water, which in turn will produce cost savings on the restaurant's natural gas bill as well. **We estimate cost savings from making this upgrade to be approximately $78 per year and full cost recovery will occur in 0.4 years**. Table 1 details these estimated savings and payback periods.

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

In the kitchen, Beautiful Savior can save water by replacing its pre-rinse spray valve. The current pre-rinse spray valve is using 3.0 gpm. **We recommend installing a pre-rinse spray valve that uses no more than 1.0 gpm. This has the potential to produce annual savings of $83 per year with full cost recovery after 0.7 years** (Table 1).

Table 1

CII Water Assessment Tool - Results **Beautiful Savior** **v 1.3**

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	5	10	0	21	$63	$0	$15	$78	$0	$30	0.4	yes	31
Pre-rinse spray valve	1	11	0	23	$67	$0	$16	$83	$0	$60	0.7	yes	16
Toilet	23	21	-	-	$130	-	-	$130	$75	$13,800	105.9	no	106
Urinal	3	26	-	-	$159	-	-	$159	$100	$1,800	10.7	no	45
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Clothes washer	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	91
Ice machine	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	
Total of All Measures		**68**	**0**	**44**	**$419**	**$0**	**$32**	**$451**	**$175**	**$15,690**	**34.4**		
Total of Included Measures		**21**	**0**	**44**	**$130**	**$0**	**$32**	**$162**	**$0**	**$90**	**0.6**		

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ) #DIV/0!
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants) #DIV/0!

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the stated fixtures with the high-efficiency models detailed above.

Table 2

City of Broomfield Water Conservation Assessment Report

Beautiful Savior Primary Contact: Eleanor
303-469-1785
,

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	5
Pre-rinse spray valve	1

Annual Savings*	Resource		Cost
Water	21,200	gallons	$100
Electricity	0	kWh	$0
Natural Gas	40	therms	$30
Total Savings	-		**$130**
Installed Cost**			$100
Potential Rebate***			$0
Simple Payback			**0.6 years**

Figure 3 shows the estimated water and energy savings associated with each proposed upgrade. Only minimal energy benefits are anticipated from these upgrades, but the water savings appear more substantial.

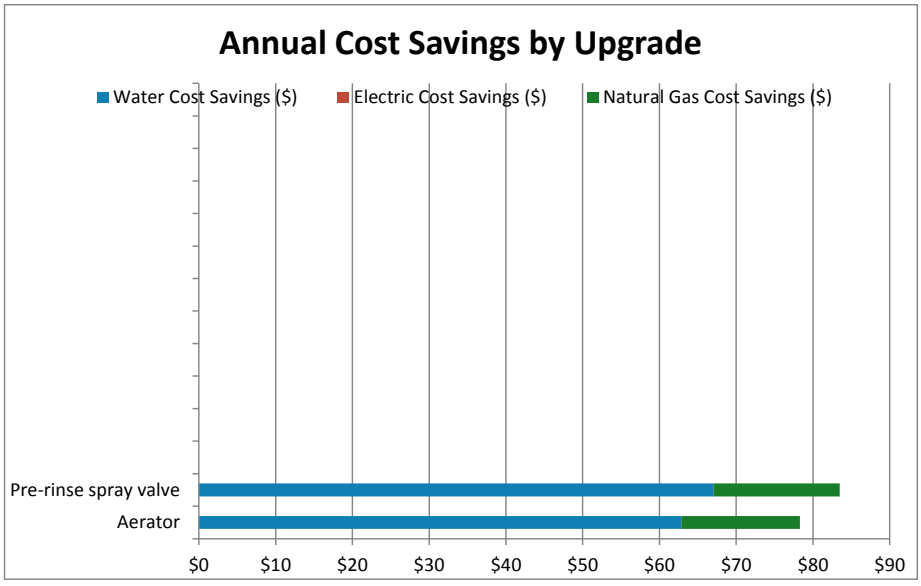


Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Beautiful Savior will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where your business can purchase the most efficient and cost-effective fixtures and appliances.

The Center for ReSource Conservation as well as your water provider, The City and County of Broomfield, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3820 and ask to speak with our Water Technician. To contact Broomfield County and City Water, you can visit to their website, broomfield.org, or call 303-438-6363.

WATER CONSERVATION Audit Report

Broomfield Academy, Broomfield, CO

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

CITY AND COUNTY OF BROOMFIELD • COLORADO •

SUMMARY: Based on our flow measurements and analysis we believe that Broomfield Academy could cost-effectively reduce water use without sacrificing performance by replacing all faucet aerators and urinals. There is up to a $400 rebate potential available to Broomfield Academy to help reduce project cots. This report provides more information on these and other water conservation opportunities at Broomfield Academy as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Broomfield Academy, Broomfield, CO

Audit conducted May 13, 2014 by the Center for ReSource Conservation

The Site

Broomfield Academy is a pre-Kindergarten through middle school age private school, with approximately 100-150 students during the year. The school operates August through May, with after-school programing, and in the summer with day camps. Broomfield Academy is located at 7203 W 120th Ave., Broomfield, CO and has five buildings on the campus. The main building was built in 1996, is 6,064 square feet (ft^2), and contains 7 toilets, 14 bathroom faucet aerators, 3 urinals and a kitchen with one pre-rinse spray valve and a single kitchen faucet aerator. The West Building was built in 1970, is 8,000 ft^2 and contains 19 toilets (including 5 flushometer toilets) and 23 bathroom faucet aerators. The Den is a 1,812 ft^2 building built in 1992 with 2 toilets and 2 bathroom faucet aerators. The pool building was built in 1980, is 2,967 ft^2 and contains 5 bathroom aerators, one showerhead, one urinal, 3 toilets and a single saltwater pool that holds 19,600 gallons of water. Six swamp coolers were installed on the West Building in 2004. Outside, the school irrigates 16,000-40,000 ft^2 of turf and shrub area around the school.

Water Use

Figure 1 displays Broomfield Academy's monthly water use since January of 2008. The chart shows the typical water usage pattern in Colorado with increased use in the summer months when outdoor watering and pool use occurs. We recommend comparing the school's monthly water bill to this figure on a regular basis in order to assess if the hotel's water use is within the expected range of 10-80 thousand gallons per month. Summer use above 50 thousand gallons or winter use higher than 20 thousand gallons may be indication of a significant leak. And while the audit did not include outdoor water use, this chart shows that it is an important part of the school's overall use. Therefore Broomfield Academy may wish to consider signing up for a free irrigation inspection, also offered by the City and County of Broomfield through the Center for ReSource Conservation. See the Next Steps section at the end of this report for further information.

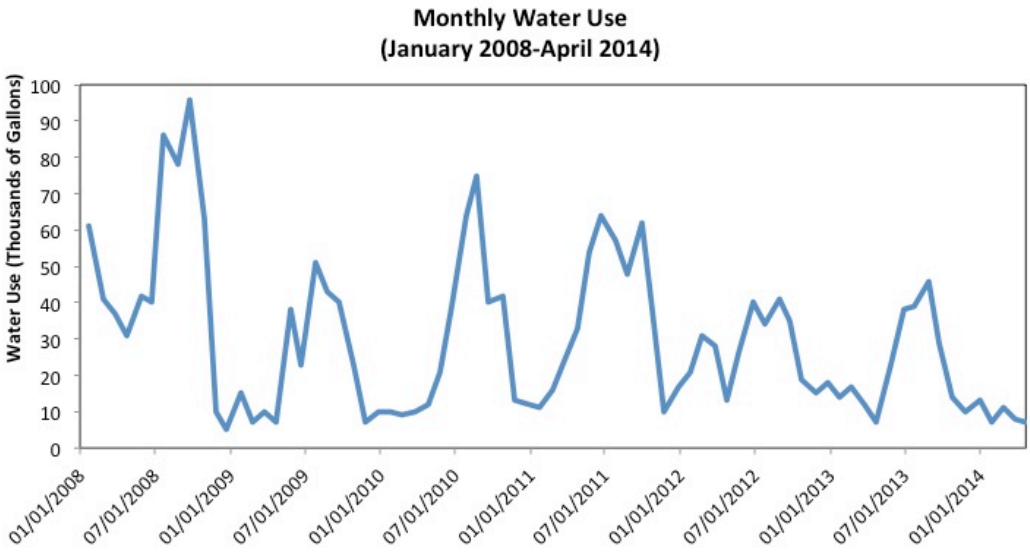


Figure 1

Figure 2 shows Broomfield Academy's Total Annual Use for 2009-2013 along with annual student Enrollment Numbers. This chart indicates that water use is not correlated with student enrollment; for example, in 2011 when the school had the second lowest enrollment, it also had the highest water use. These findings suggest that other factors, such as increased outdoor watering and/or leaks, may be driving the changes in water use a Broomfield Academy.

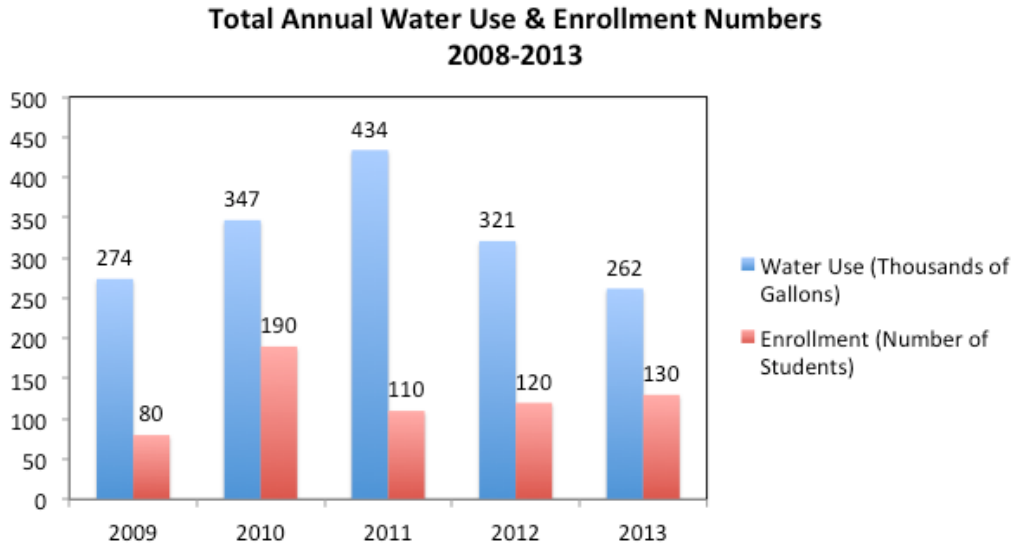


Figure 2

Upgrade Opportunities

From direct measurement of faucet aerators during the audit, we found that the current flow rates range between 1.6 and 2 gallons per minute (gpm) in all bathroom and kitchen sinks. These flow rates are above the current EPA WaterSense[1] specification and therefore **we recommend adding low-flow faucet aerators that limit flow to a maximum of 0.5 gpm flow rate at all of your bathroom sinks and 1.5 gpm at the kitchen sink.** Table 1 details the estimated savings and payback periods for this upgrade. Beyond water savings, upgrading faucets with low-flow aerators will save a significant amount of hot water, which in turn will produce cost savings on the school's natural gas bill as well. **We estimate cost savings from making this upgrade to be approximately $718 per year with an estimated payback time of 0.7 years or less.**

Another cost-effective upgrade for Broomfield Academy is to replace all restroom urinals. During the audit we found that the current restroom urinals use between 1.6 and 2 gallons per flush (gpf). All EPA WaterSense urinals use 0.5 gpf, and are tested against industry standards for durability and functionality. **Replacing the four urinals could save the school $523 per year with an estimated payback period of 3.8 years**. Furthermore, the City and County of Broomfield is offering a $100 rebate on all WaterSense labeled urinals, which may help to lower project costs. Please see Broomfield's website (www.broomfield.org) for more information.

The third upgrade opportunity for Broomfield Academy is to replace all toilets that have a flush volume above the EPA WaterSense recommended level of 1.28 gpf. Table 1 details the potential water savings, dollar savings, project costs, and estimated rebate potential for replacing all 34 of the school's toilets. We assumed that the high project cost and longer payback period would make replacement of all toilets infeasible, however, if possible **we recommend replacing the 3 toilets in the Farmhouse and the 14 toilets in the West Building**, which all have very high flush volumes of 3.5 gallons. Significant water savings would be realized from these replacements and the City and County of Broomfield is currently offering a $75 toilet rebate that would help to reduce project costs.

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

Table 1

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Aerator	48	94	0	196	$577	$0	$141	$718	$0	$485	0.7	yes
Pre-rinse spray valve	0	0	0	-1	-$2	$0	-$1	-$3	$0	$0	0.0	no
Toilet	34	163	-	-	$1,000	-	-	$1,000	$2,550	$20,400	17.8	no
Urinal	4	86	-	-	$523	-	-	$523	$400	$2,400	3.8	yes
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Clothes washer	0		0	0	-	$0	$0	$0	$0	$0		no
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Ice machine	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Total of All Measures		**343**	**0**	**195**	**$2,098**	**$0**	**$141**	**$2,239**	**$2,950**	**$23,285**	**9.1**	
Total of Included Measures		**180**	**0**	**196**	**$1,100**	**$0**	**$141**	**$1,241**	**$400**	**$2,885**	**2.0**	

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ)
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants)

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the faucet aerators and urinals with the high-efficiency models detailed above.

Table 2

City of Broomfield Water Conservation Assessment Report

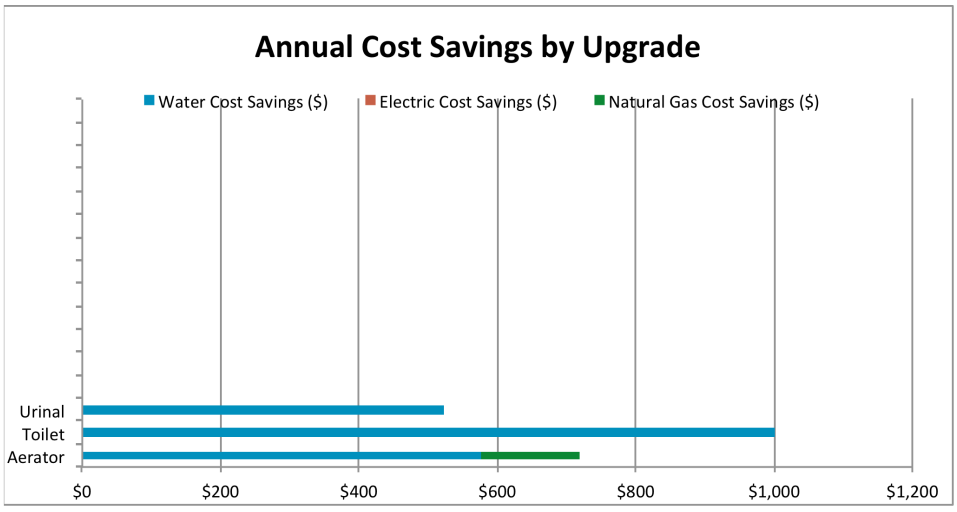
Broomfield Acade Primary Contact: Michael Greenberg
7203 W 120th Ave
Broomfield, CO 80020

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	48
Urinal	4

Annual Savings*	Resource		Cost
Water	179,700	gallons	$1,100
Electricity	0	kWh	$0
Natural Gas	200	therms	$140
Total Savings	-		**$1,240**
Installed Cost**			$2,900
Potential Rebate***			$400
Simple Payback			**2.0 years**

Figure 3 shows the estimated water, electricity and natural gas savings associated with each proposed upgrade. Only minimal natural gas benefits are anticipated from these upgrades, but the water savings appear substantial. The estimate annual cost savings of the toilets is made with the assumption that all 34 toilets are replaced.



* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.

** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.

Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. During the inspection, the auditor was alerted to a possible leak in the pool. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that businesses implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Broomfield Academy will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where the school can purchase the most efficient and cost-effective fixtures and appliances. Also, as mentioned above, we recommend signing up for a free outdoor irrigation inspection, provided by the City and County of Broomfield, and performed by the Center for ReScource Conservation (http://conservationcenter.org/water-home/slow-the-flow-colorado/) to help Broomfield Academy ensure that the outdoor water use is as efficient as possible.

The Center for ReSource Conservation as well as your water provider, The City and County of Broomfield, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3824 and ask to speak with our Water Conservation Technician. To contact the City and County of Broomfield's water department, you can visit to their website, broomfield.org, or call 303-438-6363.

APPENDIX B

Example Certificate of Completion

Certificate of Completion

Aloft Hotel

has received an

Indoor Water Conservation Audit

on April 18, 2014

performed by the ***Center for ReSource Conservation***
through the support of ***the City and County of Broomfield***

Thank you for supporting businesses that work to protect our community's natural resources.

Appendix 5

a. Water Conservation Report for Boulder Shelter for the Homeless
b. Water Conservation Report for Aloft Hotel
c. Water Conservation Report for Egg Roll King
d. Water Conservation Report for Exploring Minds Academy
e. Water Conservation Report for Adams 12 Five Star Schools
f. Water Conservation Report for U.S. Western Investment Co.

WATER CONSERVATION AUDIT REPORT
Boulder Shelter for the Homeless

September 27, 2013

Mr. Greg Harms
Executive Director
Boulder Shelter for the Homeless
3280 Broadway Ave.
Boulder, CO 80301

Dear Greg,

Thank you for taking the time to meet with us and for your assistance in conducting the water conservation audit at the Shelter on August 19. Based on our flow measurements and analysis we believe that the Shelter could cost-effectively reduce water use without sacrificing performance by replacing all shower heads and bathroom sink faucet aerators with modern low flow models. This report provides more information on these and other water conservation opportunities at the Boulder Shelter as well as estimations of potential savings and cost effectiveness of these opportunities. The report also describes financial incentives that may be available to help reduce project costs.

Water Use

Water use at the Boulder Shelter increased steadily from 2005-2009, and then leveled off in 2010-2012 (see figure 1). In 2012, the Shelter spent $17,545 on water, the highest amount over the 8 year record. Consumption data from 2013 suggest a further increase in water use.

Upgrade Opportunities

Based on discussions with the facility manager and staff, it appears that water use for showers and faucets in the Shelter's dormitory rooms are among the largest categories of water use at the facility. During the audit it was determined that both the shower (flowing at 3.0 gpm) and bathroom faucet (flowing at 2.2 gpm) flow rates are significantly higher than current industry standards. Shower flow rates can be reduced to 1.4 gpm and faucet flow rates can be reduced to 0.5 gpm using the latest technology.

Additional water savings can be achieved by replacing two pre-rinse spray valves (PRSV) in the Shelter's kitchen. We were able to replace one of these fixtures during our visit on 8/19, and hope to return with another PRSV to install (for free) in the near future.

Some water savings could be achieved by replacing existing tank-type toilets and flushometer urinals at the Shelter, but the economic benefit of these changes would be less significant than the showerheads and aerators discussed above.

CRC recommends replacement of 22 shower heads, 10 faucet aerators, and 2 PRSVs to achieve cost-effective water use reductions at the Boulder Shelter for the Homeless. We had contacted the City of Boulder and Boulder County to determine if any rebates or incentives might be available to reduce or eliminate the cost of these proposed water efficiency upgrades. A second high-efficiency pre-rinse spray valve will be installed by CRC at no cost to the Shelter.

Table 1 shows the estimated costs and savings associated with all potential water efficiency upgrades considered for the Shelter. Table 2 summarizes the potential cost savings and estimates the rebate level that might be available from the City of Boulder. Figure 2 shows the estimated water and energy savings associated with each proposed upgrade. Because of the Shelter's geothermal system, the estimated energy savings shown in this report is likely to be higher than would be actually achieved. Only minimal energy benefits are anticipated from these upgrades, but the water savings appear significant.

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

Rebates Available

The City of Boulder is offering prescriptive rebates for 50% of actual installed cost for end-use fixtures (toilets, urinals, and faucets) and 50% of equipment cost for appliances. Custom rebates are available for other projects that are designed to save 20% or more per year

compared to prior equipment or systems. Rebates are capped at $5,000 per customer and based on the actual customer invoice. However, since the Shelter is outside of the City of Boulder's primary water service area, Boulder County may be a better source of funding for these upgrades. CRC is working to investigate these options.

Next Steps

CRC is researching cost and availability of the specific showerheads and faucet aerators currently used in the Shelter. Once this information is available we will provide it to you along with information on any potential rebates from the City or County.

As I mentioned earlier, I will follow up with you the week of November 25, 2013, to see if you have any questions about this report or our findings. I am here as a free resource to help you reach your water conservation goals. Thank you again for taking the time to meet with me. I look forward to working with you.

Sincerely,

Dan

Dan Stellar
Water Program Director
Center for Resource Conservation
dstellar@conservationcenter.org

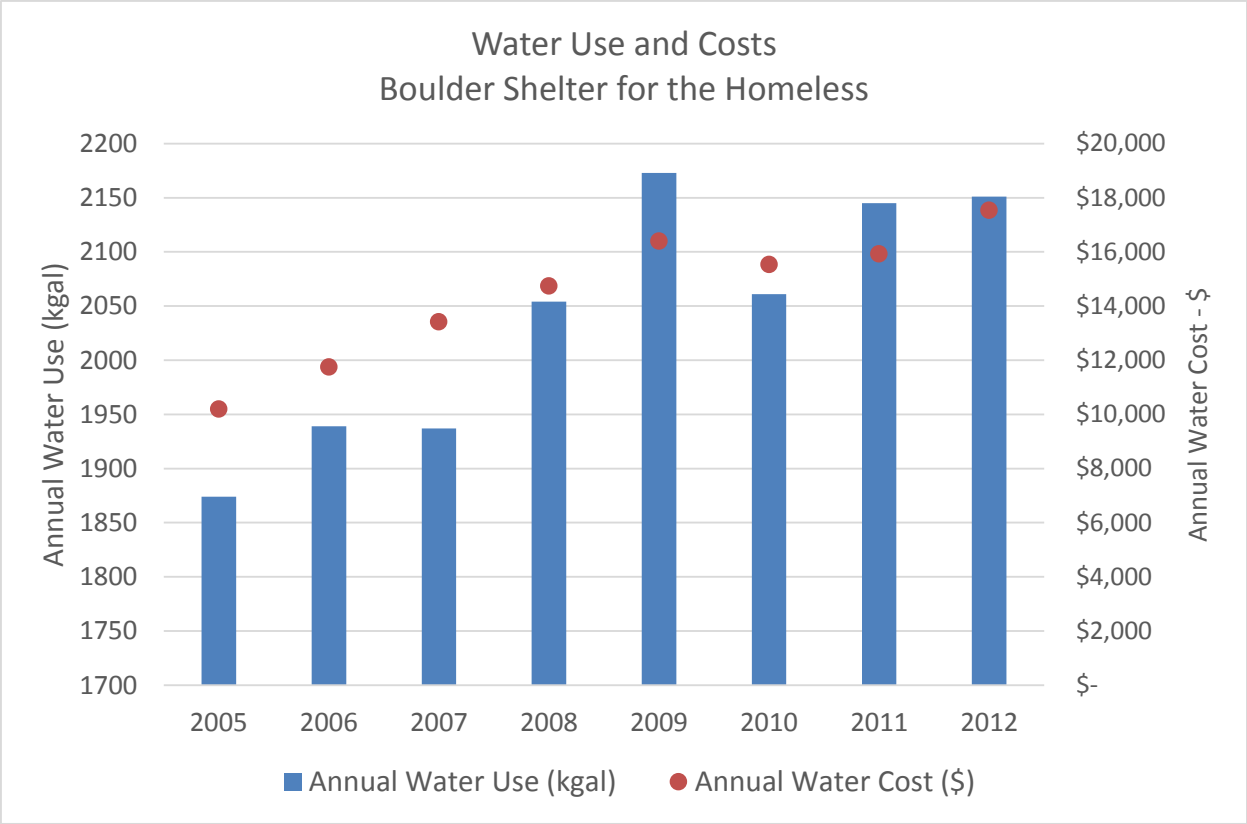

Water Use and Costs
Boulder Shelter for the Homeless
Annual Water Use (kgal)
2200
2150
2100
2050
2000
1950
1900
1850
1800
1750
1700
$20,000
$18,000
$16,000
$14,000
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$-
Annual Water Cost - $
2005
2006
2007
2008
2009
2010
2011
2012
Annual Water Use (kgal)
Annual Water Cost ($)

Figure 1

Table 1

CII Water Assessment Tool – Results — Boulder Shelter for the Homeless

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0	
Aerator	10	132	0	276	$968	$0	$168	$1,136	$150	$300	0.1
Pre-rinse spray valve	2	7	0	14	$48	$0	$8	$56	$150	$300	2.7
Toilet	15	75	-	-	$546	-	-	$546	$4,500	$9,000	8.2
Urinal	4	66	-	-	$480	-	-	$480	$1,200	$2,400	2.5
Showerhead	22	679	0	1,414	$4,963	$0	$862	$5,825	$825	$1,650	0.1
Clothes washer	0	0	0	0	$0	$0	$0	$0	-	$0	
Dishwasher (residential)	0		0	0	-	$0	$0	$0	-	$0	
Dishwasher (commercial)	1	41	827	461	$299	$33	$281	$613	50% equip.	$770	
Ice machine	0	0	0	0	$0	$0	$0	$0	-	$0	
Steam cooker	0	0	0	0	$0	$0	$0	$0	-	$0	
Food disposal	1	0	-	-	$0	-	-	$0	50% equip.		
Cooling tower	0	0	-	-	$0	-	-	$0	-	$0	
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0	
Total of All Measures		**999**	**827**	**2,165**	**$7,304**	**$33**	**$1,320**	**$8,657**	**$6,825**	**$14,420**	**0.9**
Total of Included Measures		**884**	**0**	**1,703**	**$6,459**	**$0**	**$1,039**	**$7,498**	**$2,325**	**$4,650**	**0.3**

Table 2

City of Boulder Water Conservation Assessment Report

Boulder Shelter for the Homeless
3280 Broadway
Boulder, CO 80301

Potential opportunities for water and cost savings	Qty.
Aerator	10
Pre-rinse spray valve	2
Urinal	4
Showerhead	22

Annual Savings*	Resource		Cost	
Water	883,500	gallons	$6,500	
Electricity	0	kWh	$0	
Natural Gas	1,700	therms	$1,040	
Total Savings	-		**$7,540**	
Installed Cost**			$4,700	
Potential Rebate***			$2,300	+
Simple Payback			**0.3**	**years**

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Prescriptive rebates are offered for 50% of **actual** installed cost for end-use fixtures and 50% of equipment cost for appliances. Custom rebates are available for other projects that are designed to save 20% or more per year compared to prior equipment or systems. Rebates are based on actual customer invoice and a rebate application must be submitted. Maximum $5,000 rebate per customer.

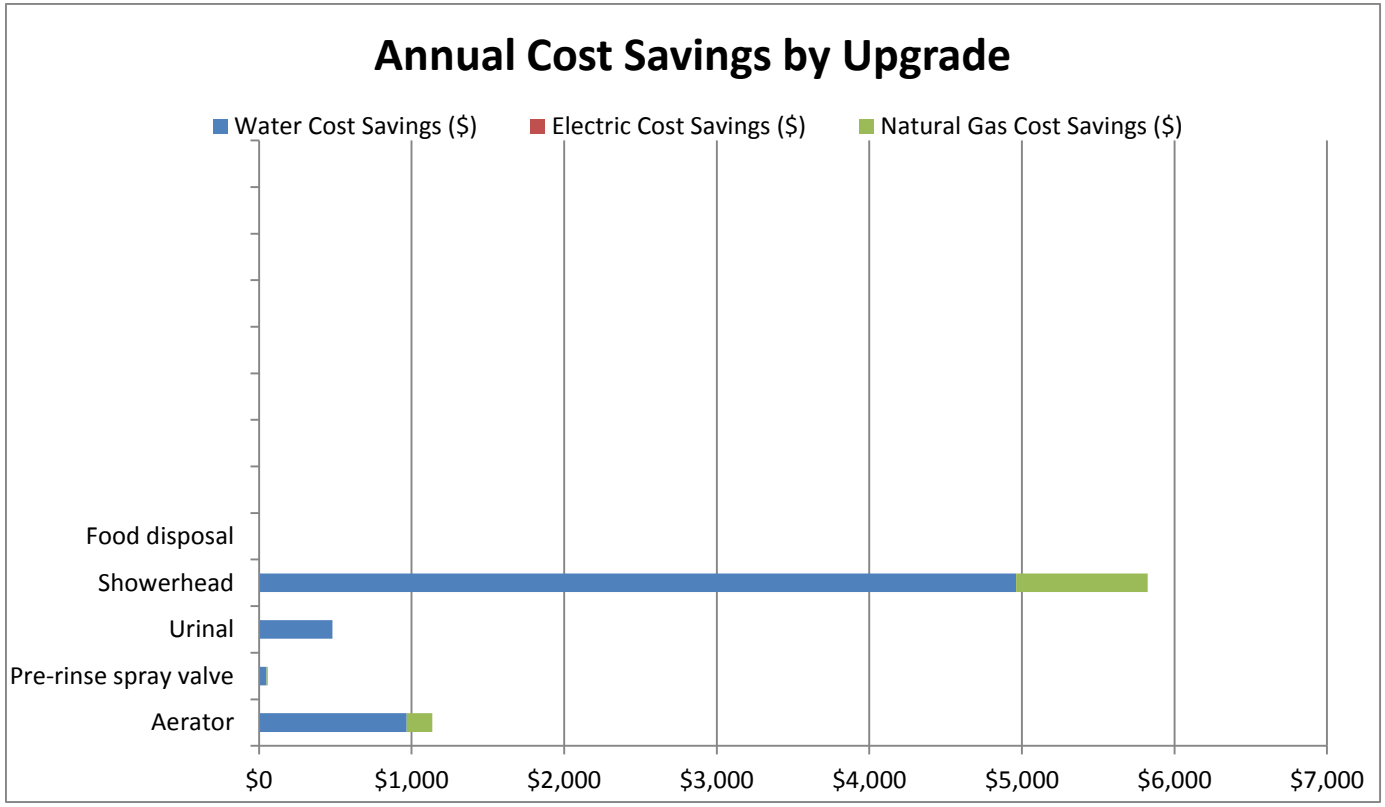

Annual Cost Savings by Upgrade
Water Cost Savings ($)
Electric Cost Savings ($)
Natural Gas Cost Savings ($)
Food disposal
Showerhead
Urinal
Pre-rinse spray valve
Aerator
$0
$1,000
$2,000
$3,000
$4,000
$5,000
$6,000
$7,000

Figure 2

WATER CONSERVATION Audit Report

Aloft Hotel, Broomfield, CO

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

CITY AND COUNTY OF BROOMFIELD • COLORADO •

SUMMARY: Based on our flow measurements and analysis we believe that Aloft Hotel could cost-effectively reduce water use without sacrificing performance by replacing all faucet aerators and four urinals. There is up to a $400 rebate potential available to the Aloft Hotel to help reduce project cots. This report provides more information on these and other water conservation opportunities at Aloft Hotel as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Aloft Hotel, Broomfield, CO

Audit conducted April 18, 2014 by the Center for ReSource Conservation

The Site

Aloft Hotel is located at 8300 Arista Place, Broomfield, CO. It has 139 guest rooms and an average occupancy rate of 69%. The hotel was first constructed in 2009 and the kitchen was remodeled in 2012. The interior of the building covers approximately 78,000 ft². Running along the road outside, Aloft Hotel has roughly 1,250 ft² of irrigated turf. The hotel maintains a single indoor pool that holds 15,000 gallons of water. Laundry is done on-site in two commercial machines located in the basement, and two residential machines located on the top floor. There is also a small bar, which is open nightly. The kitchen contains three pre-rinse spray valves, a dishwasher, two hand wash sinks and two icemakers. In the lobby and conference area there are two men's and two women's restrooms, as well as an employee restroom. Between these five facilities, there are four urinals, eleven faucets, and ten toilets.

Water Use

Figure 1 displays the monthly water use since January of 2012 at Aloft Hotel. The chart shows the typical water usage pattern in Colorado with increased water use in the summer months when outdoor watering and pool use occurs. We recommend comparing Aloft's monthly water bill to this figure on a regular basis in order to assess if the hotel's water use is within the expected range of 100-500 thousand gallons per month. Summer use above 500 thousand gallons or winter use higher than 300 thousand gallons may be indication of a significant leak.

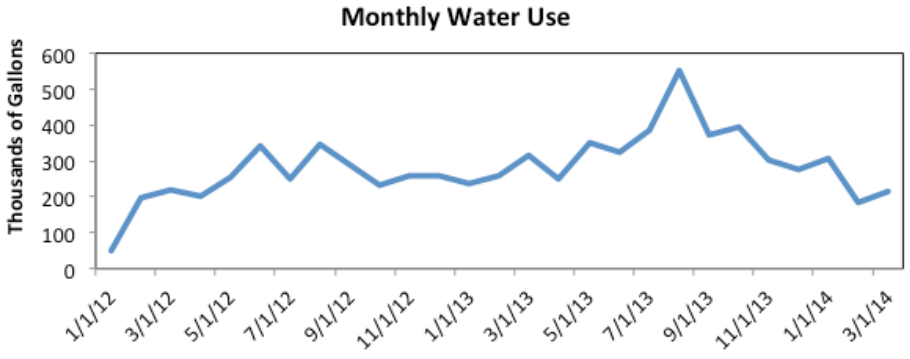


Figure 1

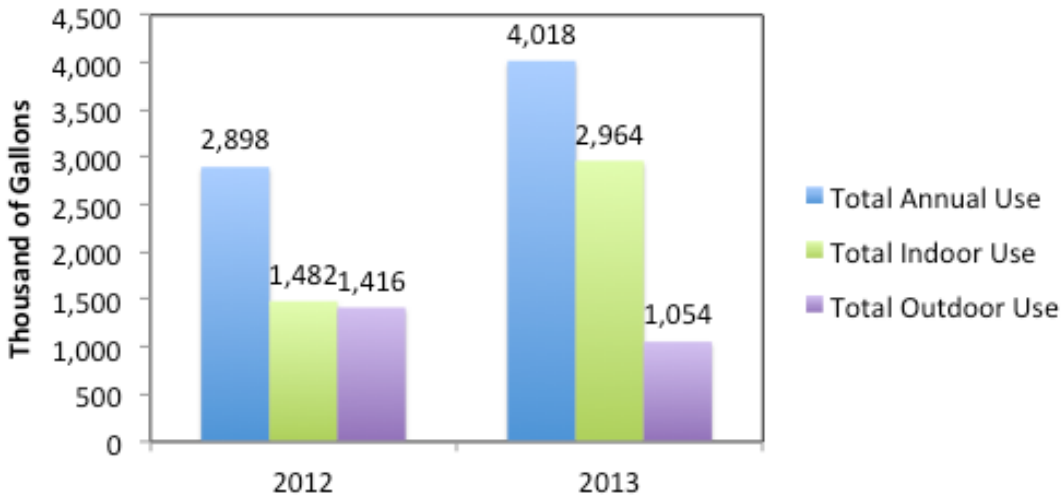


Figure 2

Figure 2 shows the Aloft Hotel's Total Annual Use in 2012 and 2013 along with the estimated Total Indoor and Outdoor Use in thousands of gallons. Total Indoor Use was estimated using the average of January and February use, when outdoor watering does not typically occur in Colorado, multiplied by 12 for the months in the year. The difference between the Total Annual Use and the Total Indoor Use equals the Total Outdoor Use. Interestingly, Aloft Hotel's Total Annual Use increased between 2012 and 2013 by 39%, however Total Outdoor Use decreased by 26% during this same time period. Total Indoor Use appears to be the largest driver for the increase in Total Annual Use, with a 100% increase over the previous year. Therefore, upgrading indoor fixtures with high-efficiency models could have a large benefit to the overall water use at Aloft Hotel.

Upgrade Opportunities

From the representative sample of guest room bathroom faucet aerators tested during the audit, the current flow rate was found to be 2.0 gallons per minute (gpm). The kitchen faucet aerators were found to have a flow rate of 4.0 gpm. These flow rates are above the current EPA WaterSense[1] specification and therefore **we recommend adding low-flow faucet aerators that limit flow to a maximum of 0.5 gpm flow rate at all of your guest room bathroom sinks and 1.5 gpm at all kitchen sinks.** Table 1 details these estimated savings and payback periods. Beyond water savings, upgrading faucets with low-flow aerators will save a significant amount of hot water, which in turn will produce cost savings on the hotel's natural gas bill as well. **We estimate cost savings from making this upgrade to be approximately $930 per year with an estimated payback time of 1.5 years or less.**

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

Another cost-effective upgrade for the Aloft Hotel is to replace all restroom urinals. During the audit we found that the current restroom urinals use 1 gallon per flush (gpf). All EPA WaterSense urinals use 0.5 gpf, and are tested against industry standards for durability and functionality. **Replacing the four urinals could save the hotel $260 per year**. Furthermore, the City and County of Broomfield is offering a $100 rebate on all WaterSense urinals, lowering project costs. Please see Broomfield's website (www.broomfield.org) for more information.

The third cost-effective upgrade opportunity for the Aloft Hotel is the single ice-making head ice machine. This type of icemaker contains the ice-making mechanism and condenser in the same unit, with a removable ice storage bin. We recommend that when replacing the current unit, Aloft upgrade to an air-cooled ENERGY STAR[2] icemaker. **This replacement has the potential to save Aloft Hotel $144 per year**. If feasible, consider selecting a nugget or flake-producing icemaker, which use less water and energy than cubed ice machines. If replacement is not feasible, use the EPA's WaterSense website to educate your staff on the recommended icemaker operation and maintenance guidelines to ensure that all ice machines are performing at the optimal level.

[2] ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals save money and protect the climate through energy efficiency measures. For more information, including third-party certified product information, please go to www.energystar.gov

Table 1

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	141	122	0	254	$747	$0	$183	$930	$0	$1,420	1.5	yes	168
Pre-rinse spray valve	0	-10	0	-21	-$60	$0	-$15	-$75	$0	$0	0.0	no	16
Toilet	139	45	-	-	$276	-	-	$276	$10,425	$83,400	264.8	no	238
Urinal	4	42	-	-	$260	-	-	$260	$400	$2,400	7.7	yes	85
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no	566
Clothes washer	0	0	0	0	$0	$0	$0	$0	$0	$0		no	9
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	91
Ice machine	1	6	1,112	0	$38	$100	$0	$138	$0	$0	0.0	yes	104
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Total of All Measures		**206**	**1,112**	**234**	**$1,260**	**$100**	**$168**	**$1,528**	**$10,825**	**$87,220**	**50.0**		
Total of Included Measures		**171**	**1,112**	**254**	**$1,045**	**$100**	**$183**	**$1,328**	**$400**	**$3,820**	**2.6**		

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ)	31%
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants)	6%

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the stated fixtures with the high-efficiency models detailed above. This Installed Cost estimate was created with the assumption that at the future time of icemaker replacement, the incremental cost for purchasing an ENERGY STAR icemaker unit will be $0.

Table 2

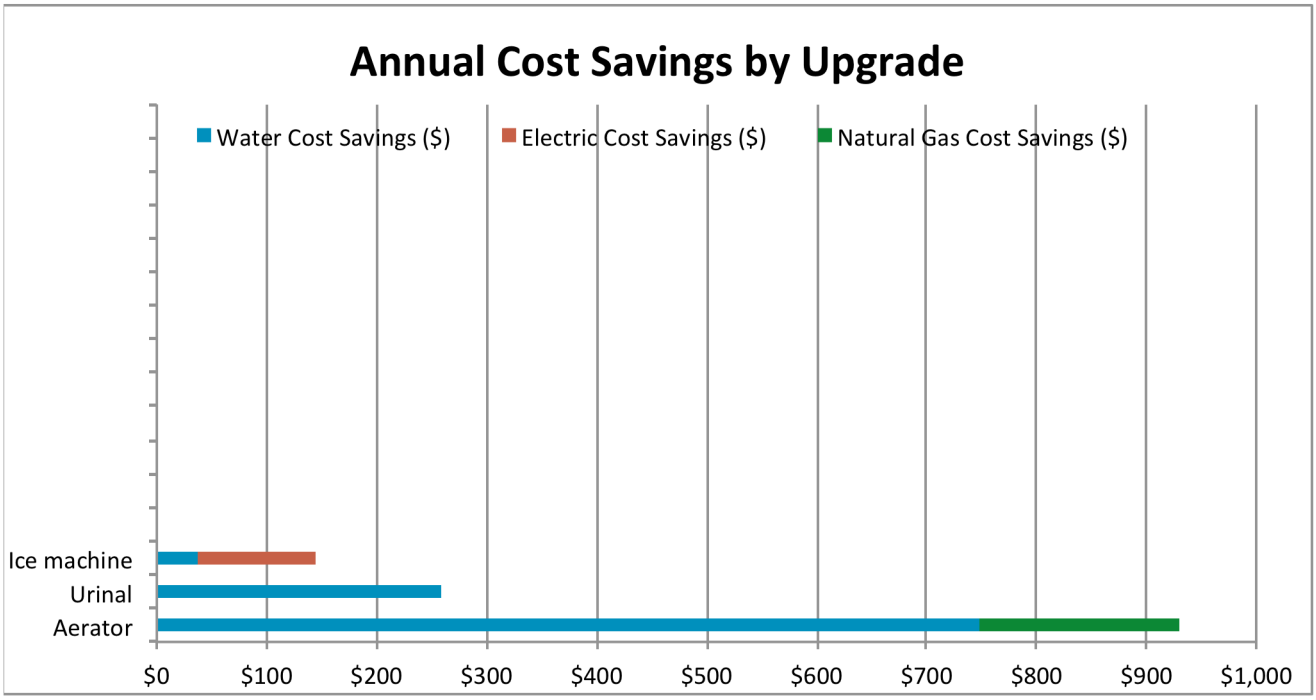
City of Broomfield Water Conservation Assessment Report

Aloft Hotel Primary Contact: Ryan Ikemeire
8300 Arista Pl
Broomfield, CO 80021

Potential opportunites for water and cost savings	Qty.
Aerator	141
Urinal	4
Ice machine	1

Annual Savings*	Resource		Cost	
Water	170,700	gallons	$1,000	
Electricity	1,100	kWh	$100	
Natural Gas	250	therms	$180	
Total Savings	-		**$1,280**	
Installed Cost**			$3,800	
Potential Rebate***			$400	+
Simple Payback			**2.6**	**years**

Figure 3 shows the estimated water, electricity and natural gas savings associated with each proposed upgrade. Only minimal electricity and natural gas benefits are anticipated from these upgrades, but the water savings appear substantial.



* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.

** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.

***Rebates are set by the water utility and will vary by utility.

Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.

- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Aloft Hotel will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where your business can purchase the most efficient and cost-effective fixtures and appliances. For hotel-specific information, webinars and Best Management Practices use the new H_2Otel Challenge web portal. Furthermore, if Aloft Hotel is interested in voluntarily participating in the H_2Otel Challenge, this audit can be directly applied to the "Assess" step of the program.

The Center for ReSource Conservation as well as your water provider, The City and County of Broomfield, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3824 and ask to speak with our Water Conservation Technician. To contact the City and County of Broomfield's water department, you can visit to their website, broomfield.org, or call 303-438-6363.

WATER CONSERVATION Audit Report

Egg Roll King

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

CENTENNIAL WATER AND SANITATION DISTRICT

SUMMARY: Based on our flow measurements and analysis we believe that the Egg Roll King could cost-effectively reduce water use without sacrificing performance by replacing all faucet aerators, urinals, and pre-rinse spray valves. This report provides more information on these and other water conservation opportunities at Egg Roll King as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Egg Roll King

Audit conducted April 9, 2014 by the Center for ReSource Conservation.

The Site

Egg Roll King is located in the shopping center at 7142 E. County Line Rd., Highlands Ranch, CO. All businesses at this address, including Egg Roll King, share a single water meter. Egg Roll King's building space is roughly 2,400 ft^2, and can seat a maximum of 45 people. On average, Egg Roll King serves fifty meals per day. The restaurant maintains one men's restroom and one women's restroom, which contain a total of three toilets, one urinal, and two faucets. In the kitchen, Egg Roll King has one ice maker, one pre-rinse spray valve, one dish washer, and three kitchen faucets.

Water Use

Egg Roll King does not have it's own water meter, however, water use data for the entire 7142 E. County Line Rd. address was analyzed for this report. Figure 1 displays the monthly water use at 7142 E. County Line Rd. since 2006. While no clear pattern exists, there are several months when water use spiked above the average monthly usage of 205.7 thousand gallons (kgal). Sustained water usage above the average, such as in 2009, was most likely caused by inefficiencies, while the single month of high usage in 2012, was more likely caused by a leak.

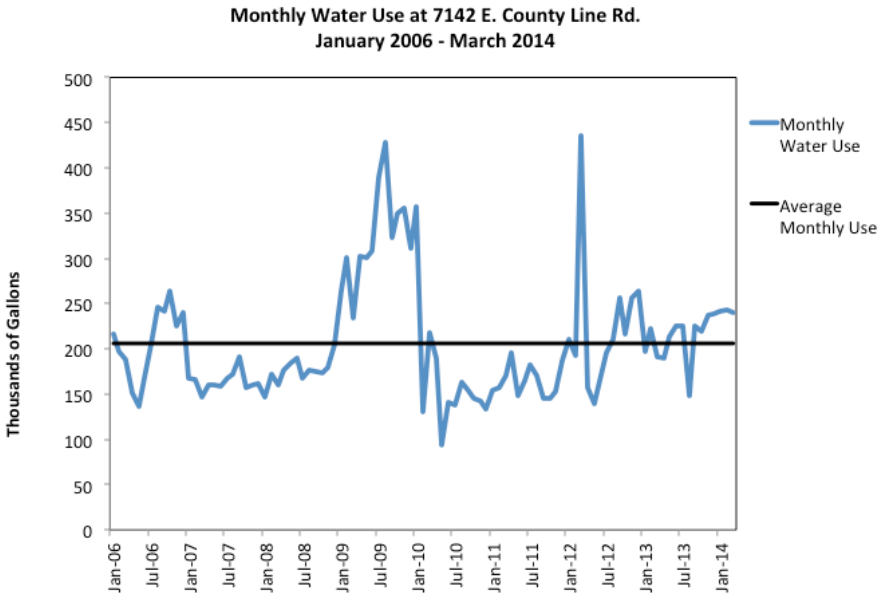


Figure 1

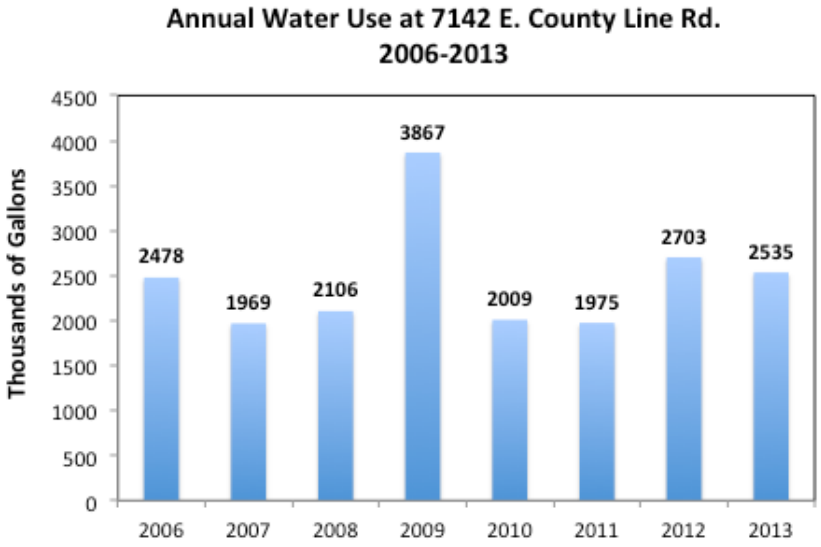


Figure 2

Figure 2 shows the total annual water use in thousands of gallons for 7142 E. County Line Rd. The sustained, high monthly usage displayed above in Figure 1 directly corresponds to 2009 having the highest total annual for all years measured. Figure 2 also shows that 2012 had the second highest annual use of the past seven years, highlighting the impact that a single above-average month can have on the overall water use of the building.

Upgrade Opportunities

During the audit it was determined that faucet aerators were using 2.0 gallons per minute (gpm). This flow rate is higher than the current EPA WaterSense specification of 1.5 gpm. **A significant water savings could be achieved by replacing all faucet aerators with 0.5 gpm aerators.** Beyond water savings, upgrading faucets with low-flow aerators will save hot water, which in turn will produce cost savings on the restaurant's natural gas bill as well. We estimate cost savings from making this upgrade to be approximately $297 per year. Table 1 details these estimated savings and payback periods.

In the kitchen, Egg Roll King can save water by replacing its pre-rinse spray valve. The current pre-rinse spray valve is using 1.5 gpm. **We recommend installing a pre-rinse spray valve that uses no more than 1.0 gpm.** This has the potential to produce annual savings of $26 per year (Table 1).

Urinals are another device that will provide Egg Roll King with water savings. The current urinals are using 1.0 gallons per flush (gpf). While this flow rate is on par with the EPA WaterSense specification, **we recommend adding low-flow urinals that use no more than 0.5 gpf.** This upgrade has the potential to produce $80 of cost savings per year (Table 1).

Table 1

CII Water Assessment Tool - Results **Egg Roll King** **v 1.3**

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	6	27	0	57	$257	$0	$41	$297	$0	$180	0.6	yes	45
Pre-rinse spray valve	1	2	0	5	$22	$0	$4	$26	$0	$150	5.8	yes	8
Toilet	0	0	-	-	$0	-	-	$0	$0	$0		no	39
Urinal	1	8	-	-	$80	-	-	$80	$0	$600	7.5	yes	17
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Clothes washer	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	91
Ice machine	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	
Total of All Measures		**38**	**0**	**61**	**$359**	**$0**	**$44**	**$403**	**$0**	**$930**	**2.3**		
Total of Included Measures		**38**	**0**	**61**	**$359**	**$0**	**$44**	**$403**	**$0**	**$930**	**2.3**		

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ) #DIV/0!
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants) #DIV/0!

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the stated fixtures with the high-efficiency models detailed above.

Table 2

Centennial Water Water Conservation Assessment Report

Egg Roll King Primary Contact: Tiffany
7142 E. County Lir 303-350-7278
Highlands Ranch, CO

CENTENNIAL WATER AND SANITATION DISTRICT

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	6
Pre-rinse spray valve	1
Urinal	1

Annual Savings*	Resource		Cost
Water	38,000	gallons	$400
Electricity	0	kWh	$0
Natural Gas	60	therms	$40
Total Savings	-		**$440**
Installed Cost**			$900
Potential Rebate***			$0
Simple Payback			**2.3 years**

Figure 3 shows the estimated water and energy savings associated with each proposed upgrade. Only minimal energy benefits are anticipated from these upgrades, but the water savings appear more substantial.

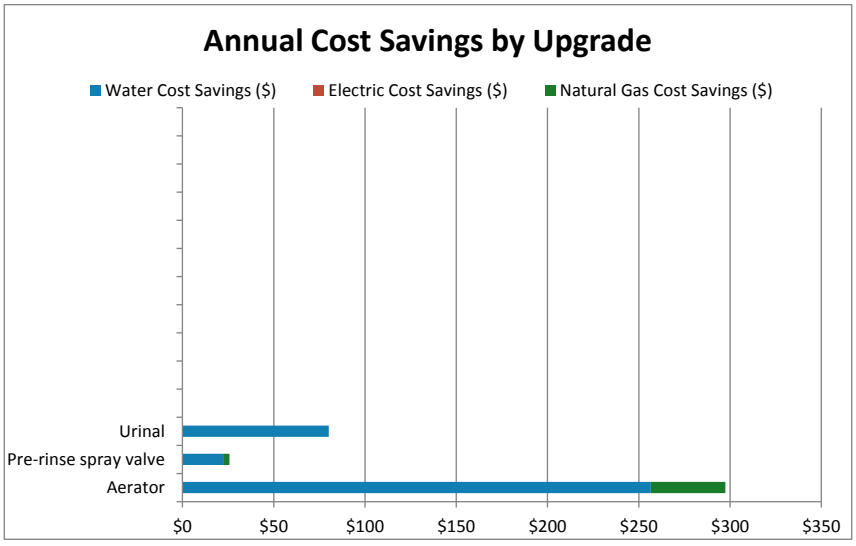


Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Egg Roll King will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where your business can purchase the most efficient and cost-effective fixtures and appliances.

The Center for ReSource Conservation as well as your water provider, Centennial Water & Sanitation District, would like to be resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3820 and ask to speak with our Water Technician. To contact Centennial Water & Sanitation District you can visit to their website, centennialwater.org, or call 303-791-0430.

WATER CONSERVATION Audit Report

Exploring Minds Academy, Erie, CO

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

TOWN OF ERIE 1874

SUMMARY: Based on our flow measurements and analysis we believe that Exploring Minds Academy could cost-effectively reduce water use without sacrificing performance by replacing all faucet aerators, toilets, urinals, and the clothes washer. This report provides more information on these water conservation opportunities at Exploring Minds Academy as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Exploring Minds Academy, Erie, CO

Audit conducted May 6, 2014 by the Center for ReSource Conservation

The Site

Exploring Minds Academy is located at 4051 NE County Line Rd, Erie, CO. The school is roughly 1,500 square feet, with some irrigated outdoor areas. Students at Exploring Minds Academy are between the ages of 6 weeks and 5 years, with a K-4th grade care program for out-of school hours. In a typical year the school has 85-100 students and 10 staff. The school is open year-round and operates 254 days per year.

Water Use

In the past 3 years Exploring Minds Academy has used an average of 234,236 gallons of water per year, or approximately 2,340 gallons per student. While this is only slightly above the average of 2,130 gallons per student used by average Colorado elementary schools, as reported by a 2007 benchmarking study for the Colorado WaterWise Council, our audit did find significant opportunities for improvement.

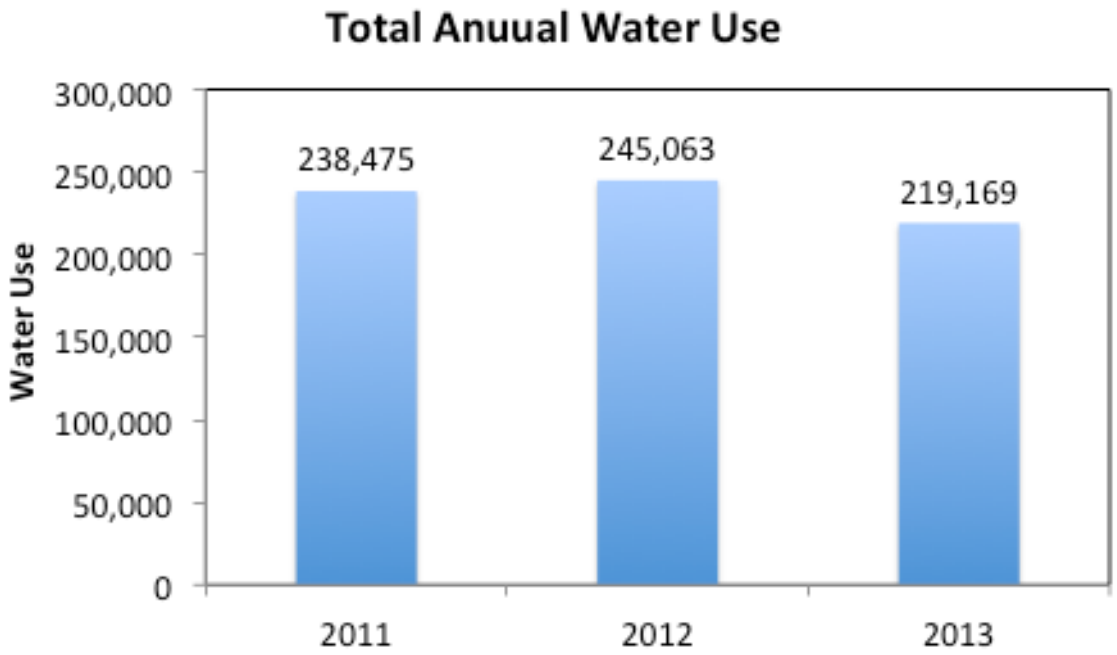


Figure 1

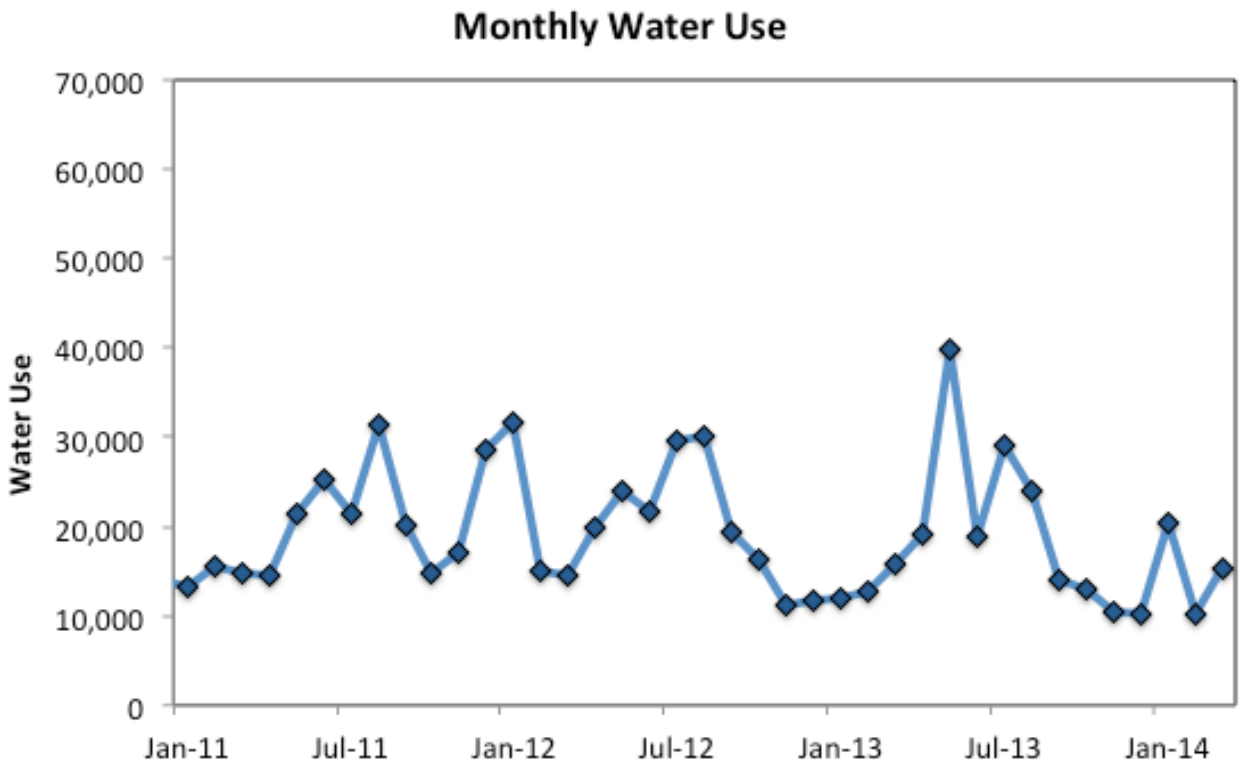


Figure 2

Figure 2 shows monthly water use since January of 2011 at Exploring Minds Academy. The lack of a strong pattern indicates that seasonal outdoor water use is not a large component of the school's total annual use. This suggests that the school will likely receive large benefits from following the recommendations for indoor water conservation upgrades provided in the section below.

Upgrade Opportunities

During the audit it was determined that all 12 of the faucets are flowing at 1.75 gallons per minute (gpm) or higher. This flow rate is higher than the current EPA WaterSense[1] specification. **A significant water savings could be achieved by replacing all faucet aerators with 0.5 gpm aerators.** Beyond water savings, upgrading faucets with low-flow aerators will save hot water, which in turn will produce cost savings on the school's natural gas bill as well. **We estimate cost savings from making this upgrade to**

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

be approximately $597 per year and full cost recovery will occur in 0.3 years. Table 1 details these estimated savings and payback periods.

In the restrooms, 4 of the 6 toilets had flush volumes of 3.5 gallons per flush or higher. **We recommend installing high efficiency toilets that use no more than 1.28 gallons per flush. This has the potential to produce annual savings of $1,157 per year with full cost recovery after 2.6 years**. Furthermore, replacing the single urinal could save the school $212 per year with a full cost recovery in 2.8 years.

Finally, we also identified water and energy conservation potential from upgrading the single clothes washer. While purchasing a new clothes washer may not be possible until the current washer is out of service, if it is replaced with an EnergySTAR[2] washer, savings from this upgrade are estimated to be $98 per year over the current model.

[2] ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals save money and protect the climate through energy efficiency measures. For more information, including third-party certified product information, please go to www.energystar.gov

Table 1

CII Water Assessment Tool - Results **Exploring Minds Academy**

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Aerator	12	39	0	82	$547	$0	$50	$597	$0	$155	0.3	yes
Pre-rinse spray valve	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Toilet	5	83	-	-	$1,157	-	-	$1,157	$0	$3,000	2.6	yes
Urinal	1	15	-	-	$212	-	-	$212	$0	$600	2.8	yes
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Clothes washer	1	6	50	15	$87	$2	$9	$98	$0	$150	1.5	yes
Dishwasher (residential)	0		0	0	-	$0	$0	$0	$0	$0		no
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Ice machine	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no
Total of All Measures		**144**	**50**	**97**	**$2,004**	**$2**	**$59**	**$2,065**	**$0**	**$3,905**	**1.9**	
Total of Included Measures		**144**	**50**	**97**	**$2,004**	**$2**	**$59**	**$2,065**	**$0**	**$3,905**	**1.9**	

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ)
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants)

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the stated fixtures with the high-efficiency models detailed above.

Table 2

Town of Erie Water Conservation Assessment Report

Exploring Minds A Primary Contact: Sandy Akers
4051 NE County L
Erie, CO 80516

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	12
Toilet	5
Urinal	1
Clothes washer	1

Annual Savings*	Resource		Cost	
Water	143,800	gallons	$2,000	
Electricity	0	kWh	$0	
Natural Gas	100	therms	$60	
Total Savings	-		**$2,060**	
Installed Cost**			$3,900	
Potential Rebate***			$0	+
Simple Payback			**1.9**	**years**

Figure 3 shows the estimated water and energy savings associated with each proposed upgrade. Only minimal energy benefits are anticipated from these upgrades, but the water savings appear more substantial.

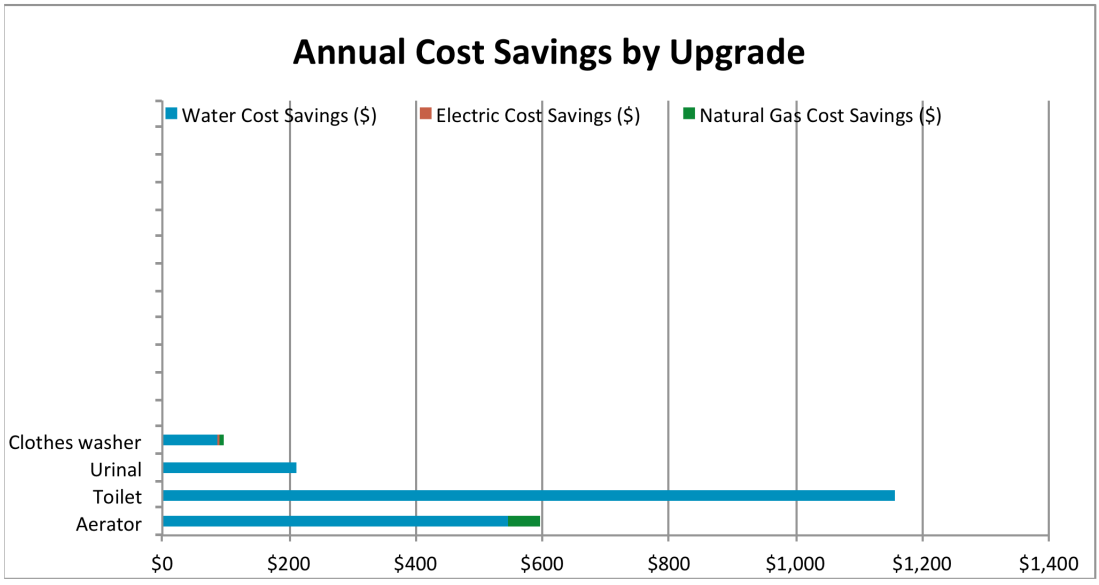


Figure 3

Best Management Practices

In addition to upgrading equipment, Exploring Minds Academy can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, Exploring Minds Academy will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where your business can purchase the most efficient and cost-effective fixtures and appliances.

The Center for ReSource Conservation as well as your water provider, the Town of Erie, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3820, ext 224. To contact the Town of Erie, you can visit to their website, www.erieco.gov, or call 303-926-2870.

WATER CONSERVATION Audit Report

Adams 12 Five Star School District, Thornton, CO

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

City of Thornton

SUMMARY: Based on our flow measurements and analysis, we believe Adams 12 Five Star School District could cost-effectively reduce water consumption at the four elementary schools by replacing all faucet aerators, as well as by taking measures to increase outdoor watering efficiency at each school. This report provides more information on these and other water conservation opportunities at these four Adams 12 Five Star Schools, as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

Adams 12 Five Star School District, Thornton, CO

The Schools

Thornton Elementary - 991 Eppinger Blvd. - April 21, 2014

Thornton Elementary was built in 1978 and renovated in 2000. The interior of the school covers roughly 48,000 ft². Thornton Elementary currently enrolls approximately 400 students and employs around 65 staff members. Thornton Elementary has a kitchen that contains one pre-rinse spray valve, one dishwasher, and one hand wash sink. A count of fixtures at Thornton Elementary revealed 45 bathroom aerators, 23 toilets, and 8 urinals.

Hunters Glen Elementary – 13222 Corona St. - April 23, 2014

Hunters Glen Elementary was built in 1987. There have been no major renovations since its construction. The interior of the school covers roughly 46,500 ft². Hunters Glen Elementary has a current enrollment of approximately 400 students and employs 55 staff members. Hunters Glen Elementary has a kitchen that contains 2 pre-rinse spray valves, one dishwasher, and one hand wash sink. A count of fixtures at Hunters Glen Elementary revealed 21 bathroom aerators, 28 flushometer toilets, and 17 urinals.

Tarver Elementary – 3500 Summit Grove Pkwy. - April 25, 2014

Tarver Elementary was built in 1980. There have been no major renovations since its construction. The interior of the school covers roughly 46,000 ft². Tarver Elementary currently enrolls 519 students and employs 66 staff members. Tarver Elementary has a kitchen that contains 2 pre-rinse spray valves, one dishwasher, and one hand wash sink. A count of fixtures at Tarver Elementary revealed 23 bathroom aerators, 32 tank-type toilets, and 19 urinals.

Riverdale Elementary – 10724 Elm Dr. - May 1, 2014

Riverdale Elementary was built in 1987. There have been no major renovations since its construction. The interior of the school covers roughly 63,000 ft². Riverdale Elementary currently enrolls 495 students and has 44 staff members. Riverdale Elementary has a kitchen that contains 2 pre-rinse spray valves (1 was replaced during the audit with a low-flow model) one dishwasher, and 3 hand wash sinks. A count of fixtures at Riverdale Elementary revealed 15 bathroom aerators, 16 tank-type toilets, and 13 urinals.

Water Use

Water use for all four of the audited elementary schools is presented in Figure 1 below. This figure shows Total Annual Water Use by year from 2004 through 2013. While Tarver and Hunters Glen Elementary Schools have used at least 2 million gallons of water each year since 2004, Thornton and Riverdale Elementary Schools used approximately 1.5 million gallons or less each year. One of the reasons that Thornton Elementary has such low use compared to the rest may be due to the finding that the school already had low flow faucet aerators and low flow toilets, whereas the other schools still have higher flow fixtures with more conservation potential.

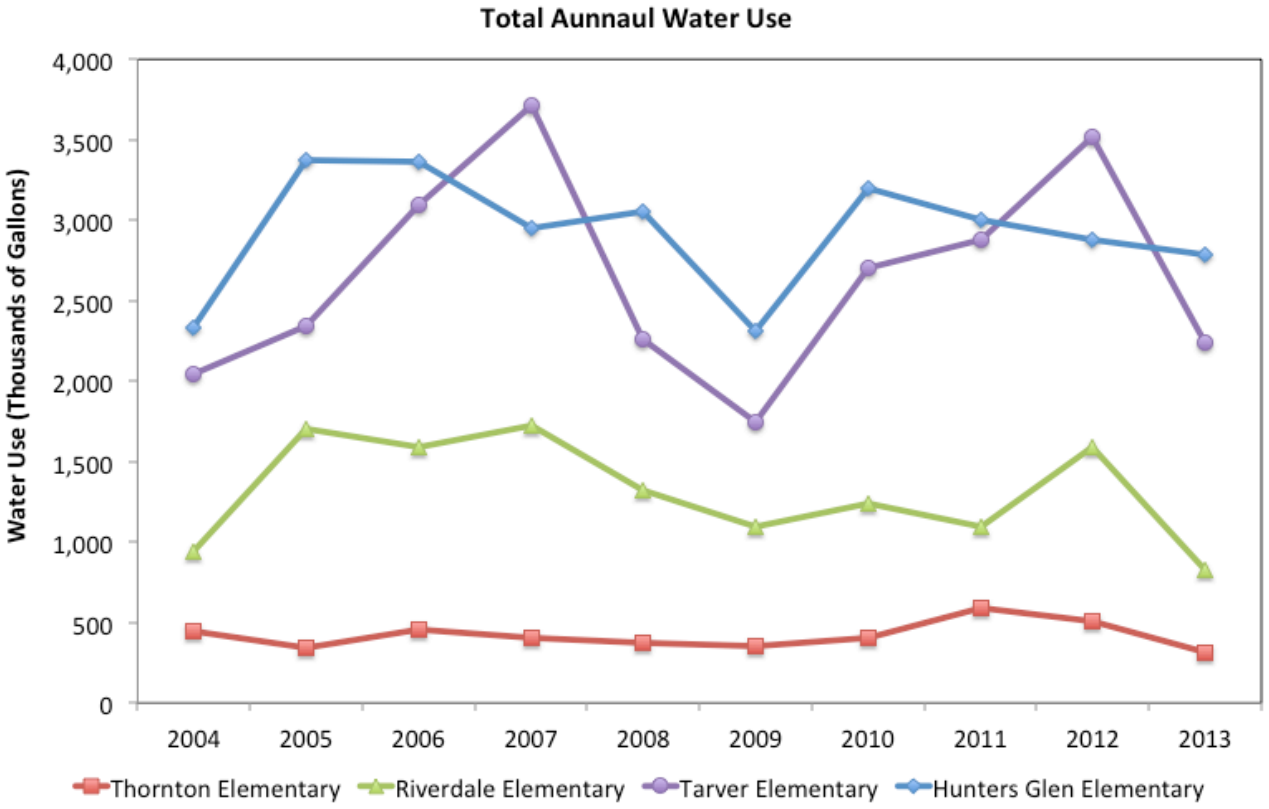


Figure 1

Figure 2, below, shows monthly water use at each school. It highlights the seasonality of water use at Riverdale, Tarver, and Hunters Glen Elementary Schools. The increased use in the summer indicates that outdoor watering is occurring. Approximately 75% of all water used at Riverdale, Tarver and Hunters Glen Elementary Schools appears to be seasonal outdoor water use. While the audits and our recommendations below are for indoor water conservation efforts, because so much of these school's water use is for outdoor use, we highly recommend that Adams 12 Star Five Schools consider receiving an outdoor sprinkler audit as well, provided free by the City of Thornton. See the final section, Next Steps, for more information on how to sign up.

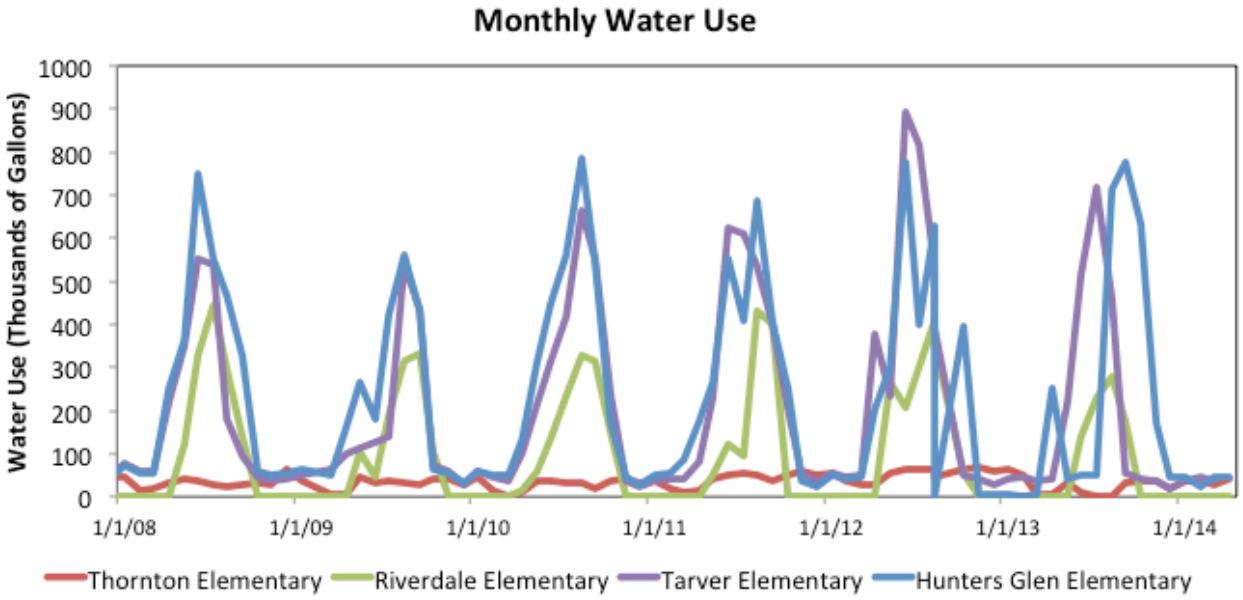


Figure 2

Upgrade Opportunities

During the audits it was determined that the majority of faucet aerators at the schools had flow rates of 1 gallon per minute (gpm) or more. **We recommend upgrading all faucet aerators to 0.5 gpm.** This change alone has the potential to **save the school district approximately $3,000 per year in monthly water bills, and it only has a 0.2 year return on investment (ROI)**. See Table 1 for details, by school, of this recommended upgrade. Some of these cost savings are due to reducing hot water use, which in turn will reduce the school's energy bills as well.

While the ROI on several of the other recommended upgrades listed in Table 1 are not as appealing, water savings alone show that **replacing all urinals with 0.5 gallons per flush (gpf) urinals** could be beneficial and **annual cost savings could be greater than $2,000 per year**. **Replacing all toilets with high efficiency 1.28 gpf models could save the school district greater than $1,000 per year**. And currently, the City of Thornton offers a $75 toilet rebate on all 1.28 gpf toilets that replace pre-1994, 3.5 gpf, or older toilets. At least one toilet at Tarver Elementary may be eligible for this rebate. For more details, contact the City of Thornton (see Next Steps section below).

Other upgrade opportunities identified during the audit are school-specific. Hunters Glen Elementary received one free pre-rinse spray valve (PRSV) during the audit, but still has water savings potential if it were to upgrade the other 2 PRSVs with 1.1 gpm or lower PRSVs. **This would save the school at least $50 per year on water bills and only has a 2 year or less ROI**. Riverdale Elementary could also benefit from receiving one more PRSV with a flow rate of 1.1 gpm or less.

Table 1

School	Fixtures to Replace	Current Flow Rate	Recommended Upgrade Flow Rate	Potential Water Savings (1,000 of gal)	Potential Cost Savings on annual water bill	Estimated ROI (years)
Hunters Glen Elementary	Bathroom Aerators (21)	1.25	0.5	117	$900+	0.2
	Pre-Rinse Spray Valve (2 of 3)	2	1.1 or less	1+	$50+	2
	Urinals (17)	1	0.5	80	$524	19.5
Riverdale Elementary	Bathroom Aerators (15)	1.5	0.5	150	$1000+	0.2
	Kitchen/other Aerator (3)	2	1.5	10+	$50+	0.2
	Urinals (13)	1.6	0.5	168	$1,101	7.1
	Toilets (16, not nurses' room)	1.6	1.28 or less	82	$536	15.7
	Pre-Rinse Spray Valve (1 of 2)	2	1.1 or less	2	$10+	16.8
Tarver Elementary	Bathroom Aerators (23)	1.5-2.5	0.5	113	$911	0.3
	Toilets (32)	1.6-3.5	1.28 or less	55	$359	46.7
	Urinals (19)	1	0.5	41	$266	42.8
Thornton Elementary	Urinals (8)	1	0.5	66	$435	11
	Toilets (23)	1.6	1.28 or less	75	$495	24.4

Best Management Practices

In addition to upgrading equipment, the school district can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

The Center for ReSource Conservation as well as your water provider, The City of Thornton, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3820, ext. 224. To contact the City of Thornton's water department, you can visit to their website, ThorntonWater.com, or call 720-977-6600.

As noted above, the majority of water use at these schools appears to be outdoor use during the summer months. The City of Thornton and the Center for ReSource Conservation also team up to provide free outdoor irrigation inspections to local businesses. For more information, or to sign up for a free inspection, please call the Center for ReSource Conservation at 303-999-3824.

WATER CONSERVATION Audit Report

U.S. Western Investment Co., Westminster, CO

Performed by:

CENTER FOR ReSource CONSERVATION

With support from:

WESTMINSTER

SUMMARY: Based on our flow measurements and analysis we believe that U.S. Western Investment Co. could cost-effectively reduce water use without sacrificing performance by adding low-flow restroom faucet aerators, toilets and urinals. This report provides more information on these and other water conservation opportunities at US Western Investment Co. as well as estimations of potential savings and cost effectiveness of these opportunities.

Water Conservation Audit Report

U.S. Western Investment Company, Westminster, CO

Audit conducted May 13, 2014 by the Center for ReSource Conservation

The Site

U.S. Western Investment Co., at 8703 Yates Dr. and 8671 Wolff Ct., Westminster, CO, has 3 separate office buildings. An outdoor water meter and indoor water meter are associated with each of the two addresses. Between the three buildings there are 51 bathroom faucets, 28 tank-type toilets and 7 urinals. There are approximately 150 daily users of these facilities.

Water Use

Figure 1 displays Annual Water Use for 2010-2013 by Indoor and Outdoor usage components for the two addresses on the account. Outdoor water use at 8671 Wolff Ct. averaged 1,223,000 gallons per year, nearly 1,000,000 gallons higher per year than at 8703 Yates Dr., which averaged 322,000 gallons per year during the same time period. Indoor use was significantly lower for both addresses, averaging 270,000 and 148,000 gallons per year at 8671 Wolff Ct. and 8703 Yates Dr., respectively.

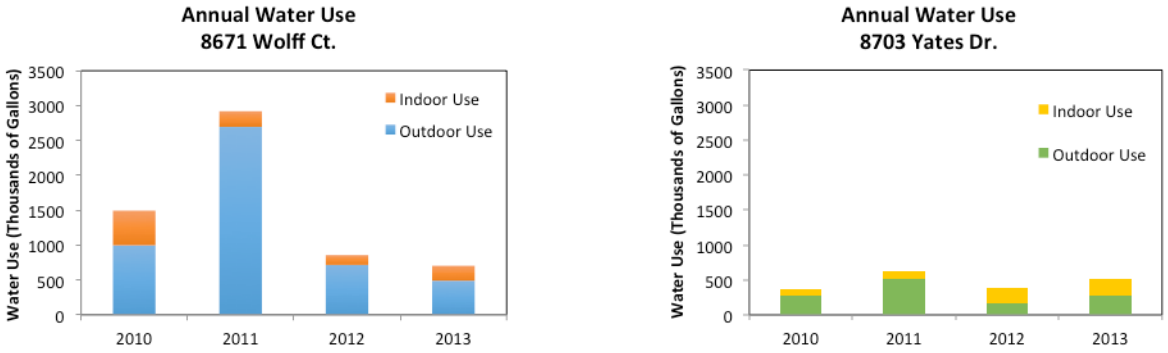


Figure 1

In 2010 water records from 8671 Wolff Ct. show that indoor use was nearly two times as high as any other year in the record. This was caused by extremely high usage in July and August of that year, likely due to a leak. The high outdoor usage in 2011 at 8671 Wolff Ct. may also have been due to a leak.

Figure 2 shows the Monthly Water Use, the sum of the outdoor and indoor use, at the two addresses between November 2009 and April of 2014. Monthly use at both addresses is similar during the winter months when outdoor watering does not occur. Again, this chart highlights that in the summer months 8671 Wolff Ct. uses significantly more water outdoors than 8703 Yates Dr. Indoor monthly use ranged between 2,000 and 43,000 gallons per month (expect for the two anomalous months from 8671 Yates Dr. in summer of 2010 mentioned above). **We recommend using this chart to compare to the two indoor water use meters (accounts 154471 & 154465), and if monthly use goes above 40,000 gallons, then there may be a leak** (e.g. toilet leak, leaky faucet, etc.) that needs to be attended to.

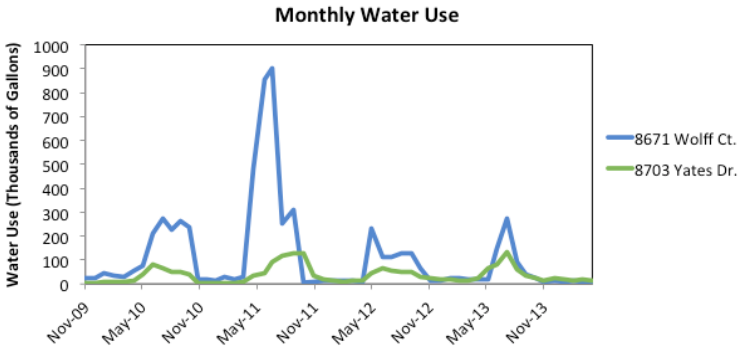


Figure 2

Upgrade Opportunities

Flow rate tests from a representative sample of restroom sinks in each office building revealed that the faucets at the two addresses are using 2.2 gallons per minute (gpm). U.S. Western Investment Company could significantly reduce water use and lower water costs by **adding WaterSense[1] labeled low-flow faucet aerators that limit flow to a maximum of 0.5 gpm flow rate at all restroom faucets.** Aerators carrying the WaterSense label have been performance tested to ensure a satisfactory experience as well as water and energy savings. Increasing faucet efficiency with WaterSense labeled aerators is expected to save a significant amount of hot water, which in turn will produce cost savings on the business' natural gas bill. **We estimate cost savings from making this upgrade to be approximately $1,308 per year and full cost recovery will occur in 0.4 years.** Table 1 details these estimated savings and calculated payback periods.

High efficiency toilets are another device that can provide U.S. Western Investment Co. with significant water savings. From the representative sample that we examined, the current toilets use 3.5 gallons per flush (gpf). **Without sacrificing performance, the U.S. Western Investment Co. could add high**

[1] WaterSense is a voluntary partnership program by the U.S. Environmental Protection Agency that seeks to protect the future of the nation's water supply by offering simple ways to use less water with efficient products, new homes and services. All WaterSense labeled products are independently certified by a third-party to meet industry-standard performance and EPA-standard water efficiency. www.epa.gov/watersense

efficiency toilets that each flush to 1.28 gallons. If all toilets are replaced, **we estimate cost savings from making this upgrade to be approximately $2,723 per year.**

A final water conservation opportunity for U.S. Western Investment Co. is to replace all urinals with WaterSense labeled 0.5 gpf models. Currently, urinals at these facilities use 1.5 gpf, therefore, **we recommend replacing all urinals with high efficiency models with maximum flush of 0.5 gallons. We estimate the savings from this upgrade to be $690 per year.**

Table 1

CII Water Assessment Tool - Results **US Western Investment Co** **v 1.4**

Measure	Quantity	Water Savings (kgal)	Electricity Savings (kWh)	Natural Gas Savings (therm)	Water Cost Savings* ($)	Electric Cost Savings* ($)	Natural Gas Cost Savings* ($)	Total Cost Savings* ($)	Estimated Rebate*** ($)	Installed Cost** ($)	Simple Payback (years)	Include Measure in Report?	Estimated Water Consumption (kgal)
Faucet	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Aerator	51	99	0	207	$1,159	$0	$149	$1,308	$0	$510	0.4	yes	139
Pre-rinse spray valve	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Toilet	28	234	-	-	$2,723	-	-	$2,723	$0	$16,800	6.2	yes	368
Urinal	7	59	-	-	$690	-	-	$690	$0	$4,200	6.1	yes	89
Showerhead	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Clothes washer	0		0	0	-	$0	$0	$0	$0	$0		no	0
Dishwasher (residential)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	1
Dishwasher (commercial)	0	0	0	0	$0	$0	$0	$0	$0	$0		no	66
Ice machine	0	0	0	0	$0	$0	$0	$0	$0	$0		no	680
Steam cooker	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Food disposal	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Cooling tower	0	0	-	-	$0	-	-	$0	$0	$0		no	0
Custom Project	0	0	0	0	$0	$0	$0	$0	$0	$0		no	0
Total of All Measures		**392**	**0**	**207**	**$4,572**	**$0**	**$149**	**$4,721**	**$0**	**$21,510**	**4.6**		
Total of Included Measures		**392**	**0**	**207**	**$4,572**	**$0**	**$149**	**$4,721**	**$0**	**$21,510**	**4.6**		

* Utility and cost savings are based on typical utility rates and equipment use practices. Actual savings may vary.
** Installed costs are based on typical equipment cost and may vary. Installed costs include the full cost of end-use fixtures and the additional cost of water-saving appliances over conventional alternatives.
***Rebates are set by the water utility and will vary by utility.

Sanitary Fixture and Laundry Fraction (30-50% typ) #DIV/0!
Kitchen Equipment Fraction (10-15% typ, 50% in restaurants) #DIV/0!

Tool developed by:
Brendle Group
(970) 207-0058
www.brendlegroup.com

Table 2 summarizes the potential cost savings realized from replacing the stated fixtures with the high-efficiency models detailed above. It is important to note that these estimates are conservative (i.e. water and cost savings are likely underestimated).

Table 2

City of Westminster Water Conservation Assessment Report

US Western Invest Primary Contact: Richard Chen
8703 Yates Dr
Westminster, CO 80031

EPA WaterSense PARTNER

Potential opportunites for water and cost savings	Qty.
Aerator	51
Toilet	28
Urinal	7

Annual Savings*	Resource		Cost
Water	392,100	gallons	$4,600
Electricity	0	kWh	$0
Natural Gas	210	therms	$150
Total Savings	-		**$4,750**
Installed Cost**			$21,500
Potential Rebate***			$0
Simple Payback			**4.6 years**

Figure 3 shows the estimated water and energy savings associated with each proposed upgrade.

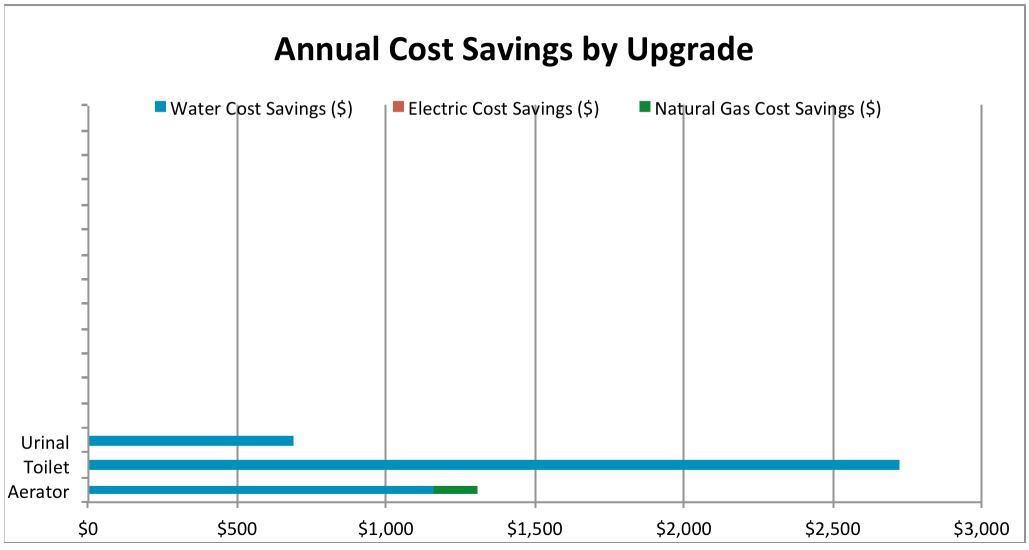


Figure 3

Best Management Practices

In addition to upgrading equipment, you can save water and money by regularly checking for and repairing leaks. According to the EPA, leaks can waste thousands of gallons of water over time. The EPA recommends that business implement the following practices to detect leaks:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the meter reading changed significantly, there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year.
- Conduct regular visual inspections of fixtures and look and listen for leaks. Train employees to notify management if they notice leaking fixtures or equipment.

For more information on Best Management Practices for your commercial facility, please visit the EPA WaterSense at Work website.

Next Steps

To realize water savings beyond leak-identification, U.S. Western Investment Co. will need to implement the water conservation recommendations from this report. We recommend using EPA's WaterSense website to find the products and retail locations where your business can purchase the most efficient and cost-effective fixtures and appliances.

The Center for ReSource Conservation as well as your water provider, The City of Westminster, would like to be a resource for your business, should you need assistance implementing any of the recommendations in this report. To contact the Center for ReSource Conservation please go to our website conservationcenter.org or call us at 303-999-3820, ext. 224. To contact the City of Westminster's water department, you can visit to their website, www.ci.westminster.co.us, or call 303-658-2400.

Appendix 6

Example of CRC's new Commercial Audit Report Format:
Water Conservation Action Plan

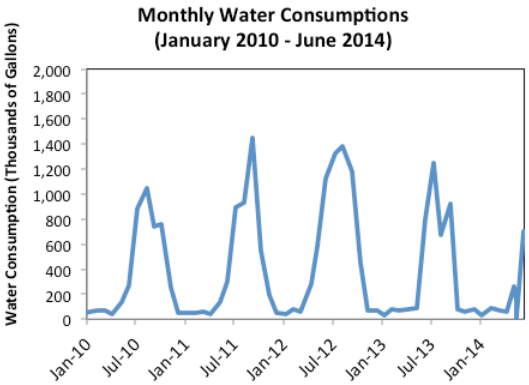
Water Conservation Action Plan

Aspen Creek K-8 School *Audit performed July 1, 2014*

CENTER FOR ReSource CONSERVATION
Conservation Starts Here

The Site

- Built in 2000 with major renovations in 2011
- 12 restrooms
- 1 men's and 1 women's locker room
- 1 kitchen



Green = fixtures with short-term ROI*, ready for immediate investment
Blue = fixtures with long-term ROI, ready for future investments
*ROI = Return on Investment

- 28 Sink Aerators – (0.4 yr ROI)
- 6 Showerheads (1.8 yr ROI)
- 29 Flushometer Toilets (>5 yr ROI)
- 16 Urinals (>5 yr ROI)
- 2 Pre-Rinse Spray Valves (1 replaced with low-flow model during audit) (>5 yr ROI)
- ENERGY STAR High-Temp Single Tank Conveyor Commercial Dishwasher
- 1 Food Disposal System

Aspen Creek's Typical Water Use

- Seasonal water use, highest in the summer when outdoor watering occurs.
- Average peak (highest) use in the summer since 2010 was 1,282,000 gallons.

look for WaterSense Meets EPA Criteria

Action Check List – Check items off this list as you replace them!

✔	Fixture to Replace (#)	Recommended Upgrade Flow Rate	Potential Water Savings	Potential Cost Savings	Return on Investment (ROI)	Extra Notes
	Bathroom Aerators (28)	0.5 gpm	94,000 gallons	$717 per year	0.4 years	Use old aerators on faucets to find correct size for upgrades.
	Showerheads (6)	2 gpm	9,000 gallons	$66 per year	1.8 years	Replacing showerheads will help save on energy bills too. Tamper-proof options available.

More Ways to Save:

- **Repair leaky toilets and faucets –** EPA reports that one leaky toilet can waste 21,600 gallons per month!
- **Educate staff and students to report leaks –** The best leak detection is through the fixture users. For more leak detection methods visit www.epa.gov/watersense
- **Review water bills monthly** – If monthly usage is above 1,282,000 gallons in the summer or above 200,000 gallons in the winter, you may have a leak!
- **Get a Slow the Flow irrigation inspection (FREE!)** – We will identify areas for improving efficiency while maintaining or even improving landscape health. Call 303-999-3824 to schedule today!

For more information on water savings opportunities for businesses please visit: www.conservationcenter.org and www.epa.gov/watersense . Thank you for participating!
This service was provided to your business at no cost by:

CENTER FOR ReSource CONSERVATION
Conservation Starts Here