



# Commercial, Institutional, and Industrial BMP Implementation Guidebook

# CII BMP IMPLEMENTATION GUIDEBOOK

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# Introduction

In December 2008, the California Urban Water Conservation Council (CUWCC) updated the Best Management Practices (BMPs) required under the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU)<sup>1</sup>, incorporating a broader approach to achieving water savings, improving water use efficiency, and measuring progress. In the past, agencies were limited to meeting specific implementation and reporting requirements in order to comply with the Commercial, Institutional and Industrial (CII) BMP. However, significant progress has been made in water conserving technologies and practices over the past decade, allowing for a much broader approach going forward. Agencies may now choose to comply with the MOU through BMP implementation, Flex Track alternatives, or performance demonstrated by a reduction in gallons per capita per day (GPCD) over time.

This guidebook has been written to assist urban water agencies with understanding and successfully administering CII conservation programs in accordance with the CII BMP. The intended audience is the Water Conservation Coordinator responsible for implementing the BMPs. It describes programs and practices to be implemented with CII customers. Program examples and references are included to assist coordinators in developing and implementing successful programs within their service areas.

Commercial, Institutional, and Industrial water demands make up a large percentage of total demand for California (see Figure 1, in the section on Identifying CII Customers). CII water use varies dramatically between business sectors as well as within a given water agency's territory, making conservation outreach, education, and implementation efforts more involved than similar programs in residential sectors. Best Management Practices (BMPs) within the CII sector should implement comprehensive yet flexible strategies, allowing an agency to work with businesses to tailor the implementation of each practice to fit local business needs and opportunities. The end result is a practice that is successful and will produce the greatest amount of cost-effective water savings.

This guidebook presents an introduction to CII water use efficiency strategies and the BMPs to best attract participants and structure a CII conservation program. The intended audience is both: 1) those agencies and conservation coordinators who have not had extensive experience in working with CII customers; this will provide them with programmatic requirements and general outlines for help in ensuring success, and 2) agencies and conservation coordinators who may want to enhance their current program with some of the possibilities discussed here.

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<sup>1</sup> The Memorandum of Understanding and Best Management Practices, as amended December 10, 2008, are available in the Resource Center at [www.cuwcc.org](http://www.cuwcc.org).

## Defining Commercial, Industrial and Institutional Water Use

Agencies may have any number of account types listed in their CII class, but those accounts defined as CII per the CUWCC include those listed below.

### ***Definitions:***

- a) Commercial: Customers who provide or distribute a product or service, such as hotels, restaurants, office buildings, commercial businesses, or other places of commerce. This does not include multifamily residences, agriculture, or customers that fall within the industrial or institutional classifications.
- b) Industrial: Customers who are primarily manufacturers or processors of materials as defined by the North American Industry Classification System (NAICS). (See below for details on NAICS.)
- c) Institutional: Customers dedicated to public service. This includes schools, courts, churches, hospitals, and government institutions regardless of ownership.

***Determining customer type:*** When no CII identification data are available, you may need to research accounts one by one. This process can often be simplified by a process of elimination: identify all industrial and institutional accounts and the remainder (often the majority) are commercial. Identifying industrial and institutional users can be accomplished by:

- a) NAISC codes are available in Table 1, below; if the information you have available is only in the form of old SIC codes, you can find a conversion tool on the following website: <http://www.naics.com/search.htm>.
- b) Inspecting customer names (e.g., institutional or city accounts)
- c) Reviewing telephone directories
- d) Consulting with your meter readers
- e) Calling the contact name in the billing database
- f) Using a short mail or e-mail (if possible) questionnaire
- g) Cross-tabulating your billing database with other databases (e.g., tax assessor land use codes, commercial business directories, energy and wastewater databases)

Table 1: NAICS Codes are a good way to distinguish CII accounts.

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Table 1: NAICS Codes

<b>NAICS Codes</b>	
<b>Code</b>	<b>Description</b>
11	Agriculture, Forestry, Fishing, Hunting
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (Except Public Administration)
92	Public Administration

## Coverage Requirements

***Define Baseline Usage:*** BMP 4 defines baseline water use as the total annual water use of all CII accounts in 2008. This total includes water use from irrigation accounts associated with CII customers. Water agencies may justify to the Council an alternative baseline year. If 2008 water use was abnormally high (e.g., major leaks or upswing in business activity), for example, an agency could seek to use another year more representative of average CII water use. Baseline water use is reported on the Base Year Data form.

### ***Calculate 10 percent of baseline usage in the year 2008***

The goal is to produce annual water savings exceeding 10 percent of CII baseline water use (2008) within 10 years of the date implementation.

From the baseline water use, the performance target will be determined as 10 percent of that baseline. Agencies will develop CII programs that potentially could be used to achieve that performance target.

***How to Achieve Performance Targets:*** Once a performance target has been established, agencies have flexibility in reaching performance targets.

For measures on the CII Flex Track list with demonstrated savings, agencies shall report the measure type and quantity installed, as well as savings attributed to water shortage measures, intervention and actions. The CUWCC Flex Track lists are available here:

<http://cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/Flex-Track-Option>.

Agencies making use of the Flex Track option shall report the type of measure implemented, the industry in which the measure was implemented, and estimated savings as well as the measure's life. Agencies shall keep detailed usage data on file and report the annual and lifetime savings.

Flex Track Frequently Asked Questions:

- a. WHAT IS FLEX TRACK? In addition to the measures on the BMP List, the Flex Track menu options may be implemented to meet the savings goal for this BMP.
- b. HOW DOES IT RELATE TO BMPs? Agencies choosing the Flex Track option are responsible for achieving water savings greater than or equal to that which they would have achieved using only the BMP list items. However, keep in mind that all Foundational BMPs must be completed in order for an agency to be in compliance.



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The Foundational BMPs include Education and Utility Operations (see MOU EXHIBIT 1. BMP DEFINITIONS, SCHEDULES AND REQUIREMENTS for full descriptions)

- c. HOW DOES IT WORK? The Flex Track Menu will be maintained and regularly updated in the MOU Compliance Policies. The Flex Track Menu was developed by the BMP Revision Committees in 2008, and will be updated from time to time by the Research and Evaluation Committee. These will be maintained in the CUWCC MOU Compliance Policy and BMP Guidebooks.

Types of Measurement: For measures on the Flex Track Menu, agencies shall use one of three methods of measurement listed below to track savings.

- a. Point-of-Retrofit Metering: usage data collected from meters installed at the point of retrofit.
- b. Customer Bill Analysis: pre- and post-program usage from utility bills from the appropriate meters related to the measures implemented. For mixed-use meters, a minimum of 12 months pre-retrofit and 12 months post-retrofit usage data shall be used to calculate savings. The data shall be normalized for weather. For dedicated meters, a minimum of 6 months pre-retrofit and 6 months post-retrofit data shall be used to calculate savings.
- c. Agency Provided Calculation: if an agency is unable to provide point of retrofit metering or customer bill analysis, the agency must document how savings were realized and the method and calculations for estimated savings. The calculation and assumptions are subject to approval by the Council on a case-by-case basis.

Industry End-use Examples: Below are examples of various end uses that are prevalent in the CII sectors. Where appropriate, a description is included, along with background information and recommendations or practices that have proven performance for each type of end use. Extensive information is provided in the East Bay Municipal Utility District's (EBMUD) Watersmart Guidebook. EBMUD has created an extensive guidebook to assist CII customers and agencies working with CII customers on potential conservation programs. Follow the links below for more information on the following titles below.

- i. Industrial Process Water Use Reduction: Process Water is defined as water used by industries and businesses to produce a product or affect a process found in industries including (but not limited to) food and beverage, auto repair and service, paper manufacturing and metal finishing. This does not include service-oriented industries, such as server rooms. The chapter addressing this issue in the EBMUD Watersmart Guidebook is here: [http://www.ebmud.com/sites/default/files/pdfs/Process-Water\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Process-Water_0.pdf).
- ii. Recycling/On Site Reuse: see 'j', below.

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- iii. Deionization: Deionization is a process in which ion exchange occurs to filter out the mineral salts from water. Installation of a deionization system has the ability to save large quantities of water depending on the application by cleaning the water well enough to be able to reuse for multiple purposes.
  - iv. Reverse Osmosis: a filtration method that removes many types of large molecules and ions from solutions by applying pressure to the solution when it is on one side of a selective membrane. The result is that the solute is retained on the pressurized side of the membrane and the pure solvent is allowed to pass to the other side.
  - v. Water Softening: the reduction of the concentration of calcium, magnesium, and other ions in hard water. These "hardness ions" can cause a variety of undesired effects including interfering with the action of soaps and the build up of scale.
  - vi. Clean in Place (CIP) Technology: sterilization of pipes in food/beverage industry.
- a. Laundries: Range from on-premises laundry facilities in the hospitality industry to industrial-sized laundry facilities to commercial laundromats. General information on laundry facilities is available in the EBMUD Watersmart Guidebook ([http://www.ebmud.com/sites/default/files/pdfs/Industrial-Laundries-and-Dry-Cleaners\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Industrial-Laundries-and-Dry-Cleaners_0.pdf)), and some specific information is available below.
- i. Commercial Laundry Retrofits: These would include retrofits to public use laundry facilities (laundromats, hotels, et cetera). Top-loading washing machines can be retrofitted with front-loading high efficiency washing machines. Also, installation of larger machines (those with multiple load capabilities) often will help the facility overall save water.
  - ii. Industrial Laundry Retrofits: These would include retrofits to private use laundry facilities, such as laundry services for restaurants, et cetera. Top-loading washing machines can be retrofitted with front-loading high efficiency washing machines. Also, installation of larger machines (those with multiple load capabilities) often will help the facility overall save water.
  - iii. Wet Cleaning: Wet cleaning is the replacement of traditional dry cleaning practices with alternative technologies. <http://www.cuwcc.org/Resources/Product-Information/Wet-Cleaning>
- b. Car Wash Reclamation Systems/Vehicle Washes: The EBMUD Guidebook has information on conservation in these systems ([http://www.ebmud.com/sites/default/files/pdfs/Vehicle-Washes-2\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Vehicle-Washes-2_0.pdf)), along with the CUWCC website (<http://www.cuwcc.org/Resources/Product-Information/Vehicle-Wash-Facilities>).

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- c. Food-Service Operations: General information is available in the EBMUD Watersmart Guidebook, and specific resources are listed below: EBMUD Water Smart guidebook:  
<http://www.ebmud.com/sites/default/files/pdfs/Restaurants-and-Fast-Food-Outlets.pdf>
- i. Waterless Wok:  
<http://www.allianceforwaterefficiency.org/1Column.aspx?id=700>
- ii. Water Efficient Commercial Dishwashers:  
<http://www.cuwcc.org/Resources/Product-Information/Commercial-Food-Service/Dishwashers>
- iii. Pre-Rinse Spray Valve (1.2 gpm or less):  
<http://www.cuwcc.org/Resources/Product-Information/Commercial-Food-Service/Pre-Rinse-Spray-Valves-PRSVs>
- iv. Ice Makers: <http://www.cuwcc.com/products/commercial-ice-makers.aspx>
- v. Food Steamers: <http://www.cuwcc.com/products/commercial-food-steamers.aspx>
- d. Thermodynamic Processes: Most commercial facilities have heating and cooling systems. Many provide simply for the comfort of the building occupants, though some are for actual process requirements (like cooling server rooms, for example).  
[http://www.ebmud.com/sites/default/files/pdfs/Thermodynamic-Processes\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Thermodynamic-Processes_0.pdf)
- e. Medical Facilities and Laboratories: Dentist offices, hospitals, and healthcare-type laboratories all use water. Because of the specialized type of service offered, there are many unique water using technologies present.  
<http://www.ebmud.com/sites/default/files/pdfs/Medical-Facilities-and-Laboratories.pdf>
- f. Photo and Film Processing: While film processing isn't as wide spread as it has been in the past, it is still done in some locations, and the most efficient technology should be implemented, if possible.  
<http://www.ebmud.com/sites/default/files/pdfs/Photo-and-Film-Processing.pdf>
- g. Metering of Individual Units: The sub-metering of apartments, strip malls, and other multi-unit dwellings and businesses has been shown to save water because of the

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information that is conveyed to the property manager with regard to saving water and saving money.

[http://www.ebmud.com/sites/default/files/pdfs/Metering-of-Individual-Units\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Metering-of-Individual-Units_0.pdf)

- h. Restrooms and Plumbing: Almost every business will have restrooms and plumbing necessary for workers. Water conservation activities on these locations is similar to residential restroom/plumbing concerns.

[http://www.ebmud.com/sites/default/files/pdfs/Restrooms-and-Plumbing\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Restrooms-and-Plumbing_0.pdf)

- i. Alternative On-site Water Sources: One way to save water is to not use potable water but rather use recycled water when available and/or find alternative on-site water sources. The EBMUD Guidebook provides an in-depth explanation of alternative on-site water sources:

[http://www.ebmud.com/sites/default/files/pdfs/Alternate-On-Site-Water-Sources\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Alternate-On-Site-Water-Sources_0.pdf)

Some examples of alternate water sources are listed below:

- i. Cooling Condensate
- ii. Foundation drain Water
- iii. Gray Water
- iv. Storm Water
- v. Rain water
- vi. Pond and water feature recycling

A great resource for in-depth analysis of industrial water reuse technologies is the book “Water Conservation for Commercial and Industrial Facilities” by Mohan Seneviratne.<sup>2</sup> Chapter 8, “Industrial Water Reuse Technologies” discusses the variety of reuse applications that can be implemented throughout a host of sectors.

- j. Water Treatment: Some businesses do on-site water treatment to enable them to obtain water of the exact quality necessary for their product.
- [http://www.ebmud.com/sites/default/files/pdfs/Water-Treatment\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Water-Treatment_0.pdf)

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<sup>2</sup> Seneviratne, Mohan. A Practical Approach to Water Conservation for Commercial and Industrial Facilities. Great Britain; Elsevier, 2007.

## Documenting Water Savings

This chapter contains a brief description of how to account for water savings using performance targets. Agencies will need to establish reasonable water savings estimates based on any one or combination of these four approaches:

***External water savings estimates:*** Water savings estimates calculated by another agency and transferred to your local case.

***Internal water savings estimates:*** Water savings estimates based on a water use analysis of the program participants at your agency. The water use analysis can be based on billing data or by special sub-metering arrangements.

***Mechanical water savings estimates:*** Engineering estimates of changes in water use to account for expected total water savings

***Performance Based:*** The performance-based route requires a higher degree of documentation and analysis than the activity-based route. The performance-based route requires not only monitoring an activity, but also developing estimates of water savings over time associated with each activity. In documenting water savings, it is important to keep the following points in mind:

- a. Burden of proof: Agencies are responsible for maintaining records of water conservation program activity and in establishing reasonable estimates of the water savings associated with each activity.
- b. Persistence of water savings: It is important to recognize that some water conservation actions undertaken by CII customers in early years may not provide the same degree of water savings in later years. This might be especially true with conservation programs focusing on behavioral changes rather than equipment changes.
- c. Site-verified water savings: The concept of “site verified” can be confusing for some of the wide range of CII programs water agencies may employ. We interpret “site verified” to go beyond a physical site inspection by water agency staff. We believe it to include all reasonable means of accounting for specific water conservation steps at an individual site. For example, having the water agency obtain copies of receipts of purchases of water savings equipment (e.g., HETs or conductivity controllers) would be an acceptable form of site verification. General public education programs (e.g., radio messages) encouraging water conservation at CII sites, in contrast, would not meet the site verified criterion.
- d. Performance Metrics: Establishing a performance metric during baseline monitoring can account for overall savings in the event that the customer sees marked increases in production. For example, if a water-efficiency project will be implemented at a large laundry facility, the number of gallons per pound of laundry should be established during the baseline period. If the pounds of laundry increases during the

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post-installation monitoring period, the gallons per pound metric can be used and compared to the pre-installation gallons per pound metric and savings can still be accounted for. This requires obtaining production information which will be supplied by the customer for the dates in which the pre and post-installation monitoring takes place.

## Identifying CII Customers

***Understanding the CII customer base:*** The first step in designing CII water conservation programs that will help meet your coverage requirements is to understand your CII customer base. CII customers, in contrast to residential customers, are diverse in how they use water. This diversity can be perplexing when designing CII conservation programs. It is also important to understand not only how many accounts comprise your CII sector but the water use they represent by percentage of the total. For example, an agency may have 60,000 total accounts of which 3,000 are CII accounts: 5 percent of all accounts. However, these accounts represent 30 percent of the overall water use for the agency. These customers may be oil refineries, power plant generators, chemical or steel manufacturers. Once analyzed, it will not be hard to see why a 5 percent of accounts can comprise 30 percent of the water use.

***Categorizing and ranking CII customers:*** Categorizing and ranking CII customers, however, can greatly simplify and lead to more effective customer targeting and marketing of conservation programs. Although the first component of BMP 4 specifies that each water agency needs to identify CII customers, you have flexibility in how to do this. BMP 4 recognizes that water agencies have different levels of information available to achieve this objective. The intent of BMP 4 is that water agencies make best use of available information to better understand CII customers and design applicable conservation programs. This chapter describes ways of identifying and working with your CII customers. It will also be useful to develop a list of top water users; 10% is a good number to start with. Keep in mind that you will want to total customers will multiple accounts to account for total water usage by one customer before the ranking process. A single manufacturer with 10 separate accounts at a single location should have their water usage summed up and then ranked on the top-water-users list.

***Designate accounts:*** At a minimum, you will have to designate whether an account is commercial, industrial, or institutional. The next section defines these categories and discusses ways you might do this. It is often beneficial, moreover, to categorize customers more specifically (e.g., restaurants, offices, retail, irrigation, schools) if the information is available.

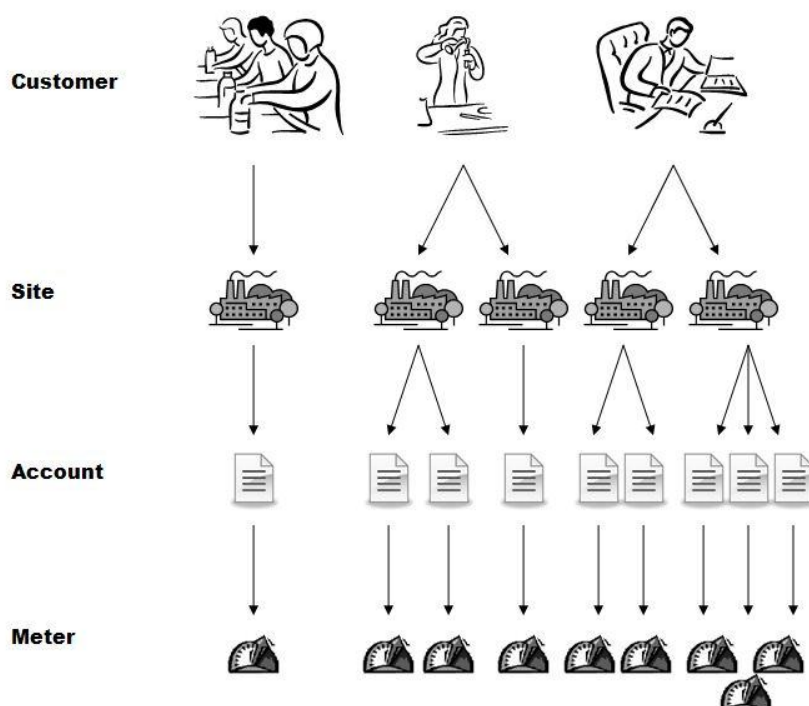
***Targeting Specific Customer Groups:*** Designating the type of account will allow you to target conservation programs at specific CII customer groups. Obtaining customer information can be time consuming and require a commitment of resources. This investment can, however, greatly assist you in identifying your best water conservation opportunities.

- a. Identify market segment
- b. Identify Customer

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- c. Site
- d. Account
- e. Meter relationships (multiple meters): A confusing issue in working with CII customers relates to the relationship among customers, sites, accounts, and meters. It can be useful to review these relationships before developing CII water conservation programs.

**Figure 1: Customer-Account-Meter Relationship**



- f. Rank by aggregated consumption, various levels
  - i. customer
  - ii. site
  - iii. account levels (one site may have several accounts)

Exclude dedicated landscape meters (covered in the [Landscape Guidebook](#))

- g. NAISC codes (see Table 1, above)
- h. Breakdown of Commercial, Industrial, and Institutional water uses, Figure 2 through Figure 4.<sup>3</sup>

<sup>3</sup> Information taken from the Pacific Institute's Waste Not, Want Not study  
[http://www.pacinst.org/reports/urban\\_usage/](http://www.pacinst.org/reports/urban_usage/)



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Figure 2: Commercial versus Industrial Water Uses in CA, 2000.

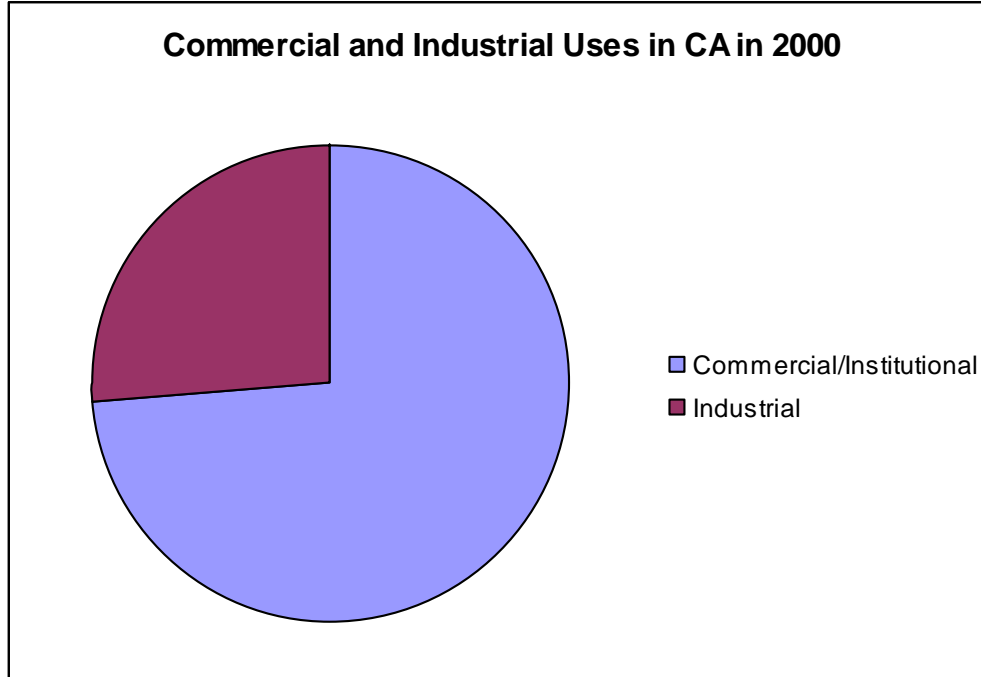
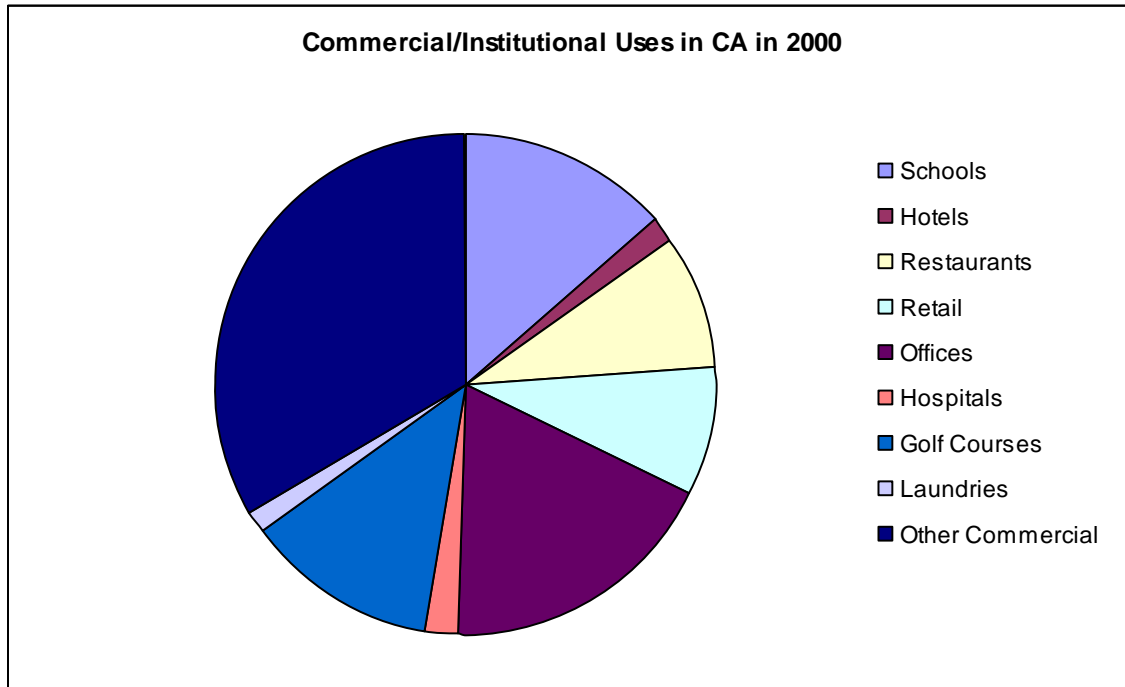
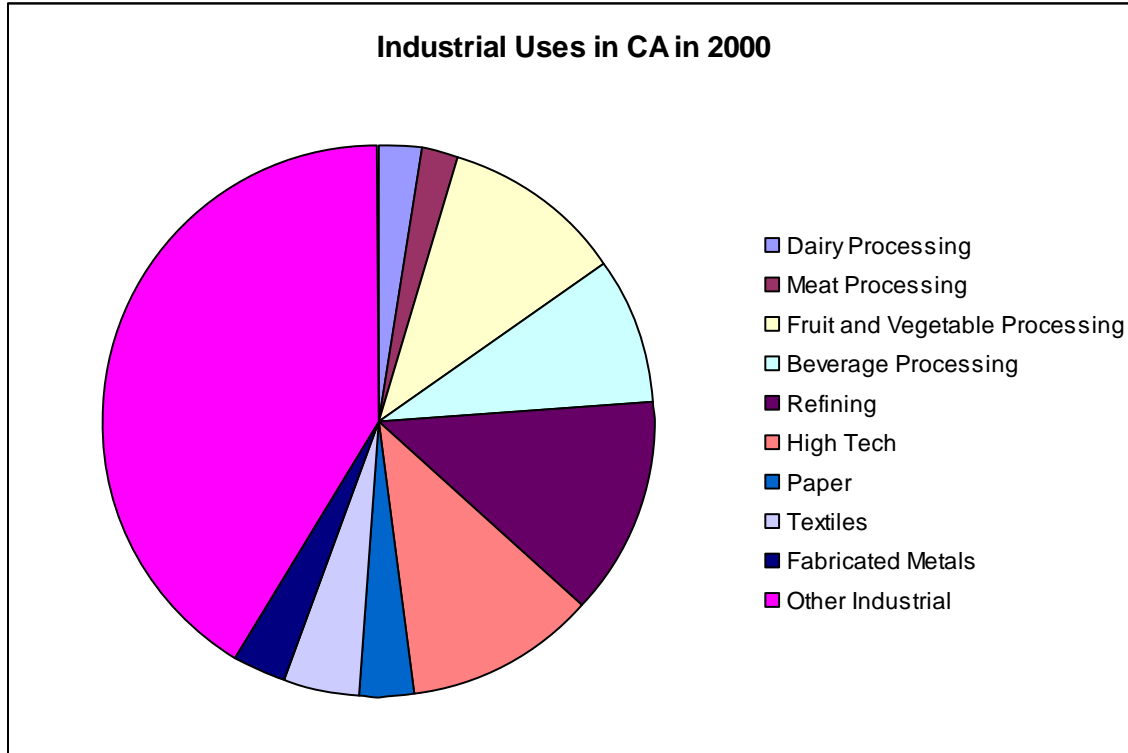


Figure 3: Commercial versus Institutional Water Uses in CA, 2000.



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Figure 4: Breakout of Industrial Water uses in CA, 2000.

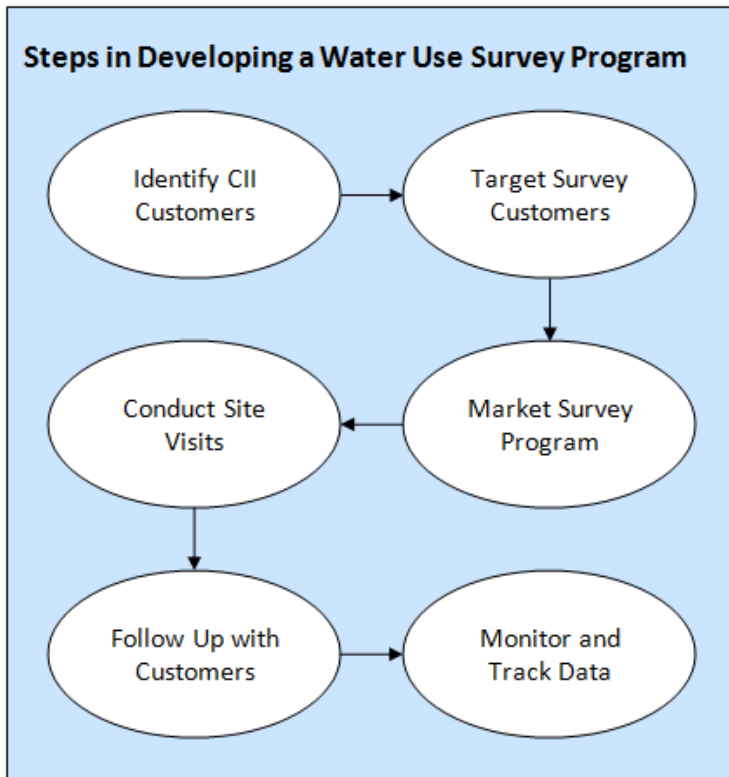


## Building a Program Portfolio - Types of Programs

The best mix of programs will depend on your agency’s circumstances and direction and customer base. Agencies can adopt some of these types of programs, variations of these programs, or entirely new programs to best reach their performance targets. An general discussion regarding attracting CII customers to water conservation programs can be found in the Seattle Public Utility’s [“Strategies to Involve the Commercial, Industrial, and Multi-family Sectors in Water Conservation” report \(2001\).”](#)

**Water-use Audits/Targeted Surveys:** Water savings resulting from water-use surveys can be used to achieve the performance-based targets instead of activity-based targets. In fact, for agencies whose CII customer make-up is such that they can survey less than 10 percent of their CII customers and still achieve the 10 percent performance target, this is likely the least costly route. Agencies with large CII customers open to participating in water surveys might be ideal candidates for this approach. In addition, note that water surveys do not have to follow the specific steps defining a water-use survey. Any survey approach or method may be used, preferably tailored to the business being surveyed, as long as water savings are achieved.

Figure 5: A Basic Flow Chart for Developing a CII Program.



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A checklist is a review of significant water end uses at the business and measures that can be implemented. Develop a checklist to assess the common water-end uses at different businesses to help get an understanding of where their water use occurs and ultimately target to manage their water use. Businesses have some portion of their water use for domestic water usage (bathroom, small break-room kitchens), process water and landscape irrigation.

Often, water use surveys are used to move customers toward financial incentive programs. Agencies are advised to target the CII water-use survey program toward CII sites with the best opportunities to save water according to the agency's customer make up. Effective targeting maximizes the cost-effectiveness of the program by achieving the largest water savings for the least cost. It also improves customer relations because it limits the number of customers who become frustrated by program participation when they discover limited or no savings potential.

- a) Site size/water use: In general, it is more cost-effective to conduct surveys at large water-using sites. This is true because survey costs do not tend to increase significantly with site size (i.e., surveys have many fixed costs) and the volume of water to be potentially saved tends to be greater at larger sites.
- b) Type of Site: Surveys can be aimed at specific customer types such as restaurants, hospitals, or semiconductor manufacturers. Similar site types tend to have similar water end uses. When a water agency completes a successful survey at one type of site, it is often beneficial to seek similar types of sites to participate in a survey.
- c) Age of Facility: Older facilities tend to have less efficient water-using technologies and may have a greater tendency to have water leaks. Hence, these sites tend to have more potential water savings that can be identified by a water-use survey.
- d) Water-Use Staff: The expertise of the water agency staff available to conduct water-use surveys may dictate the type of surveys conducted within a particular service area. If a surveyor is an expert in cooling tower water efficiency, for example, then an agency may want to utilize this expertise by targeting sites with high water use by large cooling towers.

***Technical Assistance:*** this typically refers to a program that provides customers tools and resources needed to implement successful projects. This includes but is not limited to: assistance in filling out rebate incentive forms or assisting in the selection of equipment that qualifies for rebate incentives, putting a customer in contact with another customer that has implemented a similar project or providing extensive on-line

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resources to customers. There is usually an element of marketing and a high level of customer service involved in this type of program.

***Financial incentives:*** A financial incentive can be defined as a transfer of something of value from a water agency to a customer for the express purpose of encouraging participation or installation of a conservation measure. The three primary incentive mechanisms are rebates/vouchers, direct installation/device distribution programs, pay for performance, and low-interest loans. A general discussion of financial incentives can be found in “A Guide to Customer Incentives for Water Conservation,” funded jointly by the Council, California Urban Water Agencies, and the U.S. EPA in 1994.

Agency programs can offer different types of financial incentives to encourage customers to implement water-efficient measures. Listed below are various ways to implement a financial incentive program.

- a) **Rebates:** a rebate is a partial refund following the purchase of a water efficient piece of equipment/device that provides an incentive for someone to purchase a water-efficient piece of equipment over another less efficient piece of equipment.
- b) **Vouchers:** a voucher is typically a written authorization form or certificate that can be exchanged as “cash” to partially pay for a piece of water efficient equipment.
- c) **Direct installation:** program in which the agency fully funds purchase and installation of water efficient equipment. This can provide the agency assurance that the equipment was purchased and installed correctly for maximum water savings, as agencies often contract with “certified” installation companies for this service.
- d) **Device Distribution:** program in which equipment/devices are distributed to customers either via an exchange program or through an audit. The devices are given to the customer at no cost; the customer is responsible for installation of the device. Inspection activities are likely to be built into device distribution programs to ensure water savings.
- e) **Pay for Performance:** program in which the customer is required to show actual savings in order to receive funding. The customer’s incentive is directly related to the amount of water savings.
- f) **Low Interest Loans:** this funding option is available largely from State and federal sources. For more information, please see the State Water Resources Control Board’s State Revolving Fund program: [http://water.epa.gov/grants\\_funding/dwsrf/index.cfm](http://water.epa.gov/grants_funding/dwsrf/index.cfm).

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- g) On-Bill Financing: for agencies that have control and access to their own billing systems can implement on-bill financing options for customers to assist with costs associated with implementing conservation measures. The energy utilities have been successfully offering on-bill financing to their customers. See the Southern California Gas Company's on-bill financing program for an example see pages 33-36:

<http://www.socalgas.com/for-your-business/rebates/zero-interest.shtml>

More examples of energy utility on-bill financing are available in this CA Institute for Energy and Environment document:

<http://uc-ciee.org/all-documents/a/607/113/nested>.

Agency **case studies** listed by type of program:

- Financial Incentives:
  - Irvine Ranch Water District restaurant incentives: [CII Case Study IRWD Restaurant Retrofit](#)
  - Metropolitan Water District of Orange County hotel and motel incentives: [CII Case Study MWDOC Hotel Program](#)
- Direct Install:
  - Sonoma County Water District Hospital program: [Sonoma HealthcareDirectInstall](#)
- Device Distribution:
  - West Basin Municipal Water District restaurant device distribution and training: [CII Case Study West Basin Restaurant Distribution Program](#)
- Performance Based Programs:
  - Metropolitan Water District of Orange County hotel and motel incentives: [CII Case Study MWDOC Hotel Program](#)

## Potential Devices/Opportunities for Efficiency Improvements

Many agencies have created programs for targeting specific types of businesses, specific water savings devices, or other practices that increase their customers' ability to save water. The East Bay Municipal Utility District (EBMUD) has created an extensive guidebook to assist CII customers and agencies working with CII customers on potential conservation programs. These business-type summaries (listed below) include information on how water is typically used in each type of facility as well as what type of equipment may be found at these types of locations. In addition, each of the summaries contains references to various "Water-Using Technology" sections of the EBMUD Guidebook where more detailed information can be found. For example, in the summary titled "Office Buildings," there are references to plumbing and cooling (examples of how water is used in an office building) as well as references to sections that directly address water use and savings, costs and cost-effectiveness of various product types and measures that will help reduce water use in the plumbing and cooling systems using water at those facilities. This is not, of course, the only reference available, but it gives a comprehensive and concise look at CII savings in California.

1) Office Buildings:

<http://www.ebmud.com/sites/default/files/pdfs/Office%20Buildings.pdf>

2) Schools: <http://www.ebmud.com/sites/default/files/pdfs/Schools%5B1%5D.pdf>

3) Food Service:

a. Grocers: <http://www.ebmud.com/sites/default/files/pdfs/Grocers%5B1%5D.pdf>

b. Restaurants and Fast-Food Outlets:

<http://www.ebmud.com/sites/default/files/pdfs/Restaurants-and-Fast-Food-Outlets.pdf>. Please also see the case studies listed below:

i. Irvine Ranch Water District restaurant incentives: [CII Case Study IRWD Restaurant Retrofit](#)

ii. West Basin Municipal Water District restaurant device distribution and training: [CII Case Study West Basin Restaurant Distribution Program](#)

iii. City of Santa Monica restaurant water audits and direct-install retrofits: [CII Case Study Santa Monica Restaurant Retrofits](#)

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- c. Fuel Service Stations and Convenience Stores:  
[http://www.ebmud.com/sites/default/files/pdfs/Fuel-Service-Stations-and-Convenience-Stores\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Fuel-Service-Stations-and-Convenience-Stores_0.pdf)
- d. Bakery/Pastry Shops: [http://www.ebmud.com/sites/default/files/pdfs/Bakery-and-Pastry-Shops\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Bakery-and-Pastry-Shops_0.pdf)
- e. Industrial Bakeries: [http://www.ebmud.com/sites/default/files/pdfs/Industrial-Bakeries\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Industrial-Bakeries_0.pdf)
- 4) Commercial and Retail Centers:  
[http://www.ebmud.com/sites/default/files/pdfs/Commercial-and-Retail-Centers\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Commercial-and-Retail-Centers_0.pdf)
- 5) Hotels and Motels: [http://www.ebmud.com/sites/default/files/pdfs/Hotels-and-Motels\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Hotels-and-Motels_0.pdf)  
The Metropolitan Water District of Orange County offers hotel and motel incentives with linked water audits, technical assistance, and financial incentives: [CII Case Study MWDOC Hotel Program](#).
- 6) Hospitals: <http://www.ebmud.com/sites/default/files/pdfs/Hospitals%5B1%5D.pdf>.  
The City of Santa Monica offers direct installation of water efficient devices to hospitals: [CII Case Study Santa Monica Medical Facility.doc](#).
- 7) Laboratories:  
<http://www.ebmud.com/sites/default/files/pdfs/Laboratories%5B1%5D.pdf>
- 8) Coin- and Card-Operated Laundries:  
<http://www.ebmud.com/sites/default/files/pdfs/Coin-and-Card-OperatedLaundries.pdf>
- 9) Industrial Laundries and Dry Cleaners:  
[http://www.ebmud.com/sites/default/files/pdfs/Industrial-Laundries-and-Dry-Cleaners\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Industrial-Laundries-and-Dry-Cleaners_0.pdf)



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- 10) Vehicle Washes: <http://www.ebmud.com/sites/default/files/pdfs/Vehicle-Washes%5B1%5D.pdf>

Another helpful document for vehicle water efficiencies is this paper from the International Carwash Association: [Car Wash Conservation](#).

- 11) Beverage Manufacturers: <http://www.ebmud.com/sites/default/files/pdfs/Beverage-Manufacturers.pdf>

- 12) Auto Service and Repair Shops: [http://www.ebmud.com/sites/default/files/pdfs/Auto-Service-and-Repair-Shops\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Auto-Service-and-Repair-Shops_0.pdf)

- 13) Commercial Printers: [http://www.ebmud.com/sites/default/files/pdfs/Commercial-Printers\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Commercial-Printers_0.pdf)

- 14) Metal Finishers: [http://www.ebmud.com/sites/default/files/pdfs/Metal-Finishers\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Metal-Finishers_0.pdf)

Another helpful document regarding metal finishing, written by the National Association of Metal Finishers, provides in-depth information regarding a variety of processes and final products: [Metal Finisher Information](#).

- 15) Paper Manufacturers: [http://www.ebmud.com/sites/default/files/pdfs/Paper-Manufacturers\\_0.pdf](http://www.ebmud.com/sites/default/files/pdfs/Paper-Manufacturers_0.pdf)

- 16) Water Features and Pools: <http://www.ebmud.com/sites/default/files/pdfs/Water-Features-Pools-and-Landscapes.pdf>

There is also some helpful information in the Council's PBMP document on pools, spas, and fountains: <http://www.cuwcc.org/Resources/Publications/PBMP-Reports>.

## Additional Paths to Conservation

***Water and sewer rates:*** Water agency changes in the rate structure to encourage CII water conservation can also be used to meet the performance target. If this approach is used, however, agencies may not claim water savings from any other CII conservation program; this is to avoid double counting. Hence, all of the performance target must be met with the rate structure changes. Information on rate structures may be found in the Council's [Utility Operations Guidebook](#).

***Regulations, ordinances, and laws:*** Water agencies within an area that has adopted regulations, ordinances, or laws promoting CII water conservation may use these savings as part of the performance target. This activity could also include removing regulations that prohibit conservation practices. For examples on this, please see the Council's [Utility Operations Guidebook](#).

***Codes and standards:*** Plumbing standards are an important means to advancing water efficiency in CII plumbing fixtures. In addition to Plumbing Standards, Plumbing and Building Codes play an important role in governing the installation and use of water efficient products. Information on national plumbing standards can be found in this CUWCC document:

<http://www.cuwcc.org/LinkClick.aspx?fileticket=vJgCZcBADOQ%3d&portalid=0>.

***Recycled Water:*** replacing potable water with recycled water can assist an agency in meeting SB7X-7 mandatory water conservation goals (information available here: <http://www.water.ca.gov/wateruseefficiency/sb7/>). Be aware of the use of recycled water within your agency's service area in order to know if it is available for use CII customers. While not all CII businesses have the ability to use recycled water (due to cost, availability, and the quality of water required for their product), if it is useable by the business, it is to the agency's advantage to make it available to the business. Please see Chapter 8 in Mohan Seneviratne's book titled "Water Conservation for Commercial and Industrial Facilities" for more information regarding water reuse in the CII sector.<sup>4</sup>

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<sup>4</sup> Seneviratne, Mohan. [A Practical Approach to Water Conservation for Commercial and Industrial Facilities](#). Great Britain; Elsevier, 2007.

## Typical CII Budget Considerations

Agencies may determine that the best method of setting financial incentives is based on the avoided cost of purchasing water. Think along the lines of, “how much will the next gallon of water cost? What is my allowable avoided cost (on a per acre foot basis)?” A detailed report was prepared for the CUWCC in 2006. More information can be found in the “Water Utility Direct Avoided Costs from Water Use Efficiency” on the DWR website: [http://www.water.ca.gov/calendar/materials/cuwcc\\_avoid\\_cost\\_model\\_user%27s\\_guide\\_16296.pdf](http://www.water.ca.gov/calendar/materials/cuwcc_avoid_cost_model_user%27s_guide_16296.pdf).

Work with your finance department to determine these figures. Projected costs are almost always possible to estimate over the lifetime of the device, which is necessary in determining the cost/benefit of agency programs and projects. Take into account the technology being incentivized and ask whether or not there are verifiable savings associated with the device/technology and what the life span of that technology/device may be. These factors can then be used to determine how much water will be saved over the lifetime of the device. There is a valuable benefit/cost analysis tool available on the Alliance for Water Efficiency (AWE) website:

[http://www.allianceforwaterefficiency.org/benit\\_Cost\\_Introduction.aspx?terms=cost+benefit+analysis](http://www.allianceforwaterefficiency.org/benit_Cost_Introduction.aspx?terms=cost+benefit+analysis).

Additional information factoring in environmental benefits can also be found on the CUWCC website: <http://216.151.6.233/Portals/0/Environmental%20Benefits%20User%20Guide.pdf>.

## Partnerships:

Partnerships can make a variety of programs much more cost effective. Some of the potential partners for water use efficiency programs in the CII sector are listed below.

1) Wholesale-Retail Partnerships: Wholesale agencies programs many times are available throughout a wholesale agency's service area, and retail agencies may choose the level of participation they wish to commit to. This involvement can include anything from assistance in marketing the program to their customers to contribution of funding to enhance incentives in their specific service area (namely to increase customer participation levels). More information on partnership programs is available in the CUWCC's [Utility Operations Guidebook](#) and [Residential Guidebook](#).

2) Energy and Wastewater Utility Partnerships: Partner with energy and wastewater utilities to expand incentive opportunities. The energy/water partnership offers customers a single greater dollar amount rebate, streamlines the rebate application experience, and enhances knowledge of the issues surrounding water and energy efficiency. Also by combining rebate processing activities, administrative costs are reduced through elimination of duplicative functions.

3) Government Partnerships: State and federal grants are often available for the implementation of this BMP. The Bureau of Reclamation grant award website offers some examples of grant-funded projects implemented around California: <http://www.usbr.gov/mp/watershare/grants/index.html>).

4) Environmental Groups: Environmental groups can reach a totally different audience than an agency may have access to. They also can provide good, locally-specific, and cost-effective labor to help in implementing a program.

## Additional Benefits to the Commercial Sector

If a water agency needs more reasons for CII sector customers to participate in water conservation activities, there is a long list available below. The CUWCC can also provide advice and expertise, and is available through contact methods here: <http://216.151.6.233/About-Us/Contact-Council-Staff>.

A great reference on this topic is Chapter 9 in Mohan Seneviratne's book: "Water Conservation for Commercial and Industrial Facilities."<sup>5</sup> This chapter, entitled "Making a Financially Sound Business Case," discusses making the business case for conservation, computing cash flows, appraising the investment, and assessing the risk of project implementation: all of the questions that an agency's CII customers will ask when looking to implement the new technology.

***Public Relations Value:*** Agencies can also provide non-monetary incentives to customers via positive public relations. This is a very important tool to motivate the CII customer to implement conservation programs. Customers successfully participating in the water-use survey program can be publicly commended in newspaper articles through press releases, in local radio or TV spots, or at special award luncheons/breakfasts. These are important to keep in mind and can often tip the scales in your favor if the company is still determining whether implementation of a project is worthy. More information regarding this type of incentive is available in the CUWCC's [Public Information Guidebook](#).

Additionally, Green Business Certification programs that certify businesses for meeting a number of items of a checklist of sustainable practices (including water conservation) are beneficial recognition programs many businesses strive to participate in. Although voluntary, these programs show businesses the correct way to operate their facility without imposing fines or retribution. Several of these types of certification methods/businesses are available online, and a water agency interested in this must research the appropriate outlet.

***Sustainability Policies:*** More and more companies are adopting corporate-wide sustainability policies to help guide decisions about purchasing, production and overall resource consumption. The backdrop of a sustainability policy can also serve as a way

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<sup>5</sup> Seneviratne, Mohan. [A Practical Approach to Water Conservation for Commercial and Industrial Facilities](#). Great Britain; Elsevier, 2007.

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for engineering or maintenance staff to present projects to upper management. These policies are an ideal way to hold executive management accountable to implementing conservation programs. The California Sustainability Alliance provides a number of ideas for incorporating sustainability into businesses: <http://sustainca.org/>.

***Wastewater discharge limits:*** Another benefit to implementing conservation programs can be associated with constraints placed on businesses in regards to their wastewater discharge limits. The San Jose area, for example, has significant limits on wastewater discharges into San Francisco Bay. In this case, CII water conservation could allow a company to expand production without adding to the effluent discharge – additionally saving money, too!

***Energy Savings:*** Saving water often times means saving energy too. This is most true in cases where hot water will be saved as a result of equipment upgrades/retrofits. These savings numbers can be provided to the customer along with the water savings information and can increase the cost effectiveness of a project and may further influence the customer to implement. Additionally, there may be incentives offered by the energy utilities for a number of water conservation activities that can also make projects more cost effective. The Bureau of Reclamation completed a study in 2009 of the water and energy relationships between agencies in southern California. The study can be found here: <http://www.usbr.gov/lc/socal/planning.html>. Arizona has created a water-energy nexus analysis document to help their water service agencies make programmatic decisions:  
[http://www.waterenergy.nau.edu/docs/Best\\_Practices\\_Guide\\_2009.pdf](http://www.waterenergy.nau.edu/docs/Best_Practices_Guide_2009.pdf).

***Leading by Example for Institutional Customers:*** It may be useful to point out to institutional customers that if they are in the process of asking their businesses to conserve water that they “practice what they preach.” In addition, institutional customers are often at a disadvantage financially to implement water-use efficiency projects. The added benefit to ‘practicing what you preach’ is the site will have new equipment.

***Retaining Industries:*** Businesses that are considering relocation as a way to deal with rising water costs may want to implement a water-use efficiency project in order to remain competitive in their current location rather than move to another city/state/country, etc. This can create an excellent partnership nexus with a local water agency’s city, county, or other chamber of commerce.

## Funding Sources

There are a variety of agencies that provide funding for projects that service the CII sector. For more information about the below agencies, click and follow the links provided.

- 1) California Department of Water Resources: <http://www.grantsloans.water.ca.gov/>
  
- 2) United States Bureau of Reclamation:  
<http://www.usbr.gov/WaterSMART/grants.html> or [www.grants.gov](http://www.grants.gov)
  
- 3) California State Water Resource Control Board:  
[http://www.waterboards.ca.gov/water\\_issues/programs/grants\\_loans/](http://www.waterboards.ca.gov/water_issues/programs/grants_loans/)
  
- 4) The Metropolitan Water District of Southern California: this is a wholesale agency that offers grants to its member retail agencies for new and innovative conservation devices. There is funding available to help determine real-world savings numbers.  
<http://www.bewaterwise.com/icp.html>.
  
- 5) Private Foundations: While foundations often offer money exclusively to non-governmental non-profit organizations, partnerships between water agencies and local non-profit organizations have often been forged in order to take advantage of these funds. There are a number of private foundations that grant funding for innovative projects that address various social issues, one of which may be water conservation. Agencies may research available opportunities here:  
[http://fundsnetsservices.com/searchresult.php?&sbcat\\_id=107&pg=5](http://fundsnetsservices.com/searchresult.php?&sbcat_id=107&pg=5).  
Sierra-region-specific opportunities are listed here and updated regularly:  
<http://www.sierranevadaconservancy.ca.gov/other-assistance>.

## Links to Other Useful Resources

These documents may be borrowed by members from the CUWCC library or, in some cases, found online.

DISCLAIMER: please note that while the Council acknowledges these materials as useful references, the Council does not endorse opinions, judgments, and/or outlooks provided by the independent organizations represented within their documents. Note that conclusions found within these documents may not always be applicable or even legal for local, California-based organizations to employ.

- 1) Watersmart Guidebook, A Water-Use Efficiency Plan Review Guide for New Businesses: EBMUD created an extensive guidebook to help new businesses use water more efficiently. This guidebook also serves as a reference for agencies working with CII customers. It provides information on water-saving technologies applicable to the CII sectors and is intended for use as a resource by existing and new businesses, developers, consultants, designers, planning agencies and water providers (for plan review and/or for reviewing and estimating water use at existing businesses respectively). The EBMUD guidebook is referenced extensively throughout this guidebook and can be viewed in its entirety by clicking on the following link: <http://www.ebmud.com/for-customers/conservation-rebates-and-services/commercial/watersmart-guidebook>
  
- 2) Waste Not, Want Not: The Potential for Urban Water Conservation in California: This report was published in November 2003 by the Pacific Institute. Particular sections of this report are pertinent to the CII sector and can be found by clicking on the following links:
  - a. Appendix C: Industrial and Commercial Water Use:  
[http://www.pacinst.org/reports/urban\\_usage/appendix\\_c.pdf](http://www.pacinst.org/reports/urban_usage/appendix_c.pdf)
  - b. Appendix D: Details of Commercial and Industrial Assumptions:  
[http://www.pacinst.org/reports/urban\\_usage/appendix\\_d.pdf](http://www.pacinst.org/reports/urban_usage/appendix_d.pdf)
  - c. Appendix E: Details of Commercial Water Use and Savings Potential:  
[http://www.pacinst.org/reports/urban\\_usage/appendix\\_e.pdf](http://www.pacinst.org/reports/urban_usage/appendix_e.pdf)
  - d. Appendix F: Details of Industrial Water Use and Savings Potential:  
[http://www.pacinst.org/reports/urban\\_usage/appendix\\_f.pdf](http://www.pacinst.org/reports/urban_usage/appendix_f.pdf)
  - e. Appendix G: CII Conservation Potential by Region:  
[http://www.pacinst.org/reports/urban\\_usage/appendix\\_g.pdf](http://www.pacinst.org/reports/urban_usage/appendix_g.pdf)



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- 3) United States Bureau of Reclamation: WEEP Study: Exploring the Water and Energy Nexus: This study was conducted by USBR in 2008 to assess potential opportunities, identify barriers and examine local and statewide benefits of a regional program that enables water, wastewater and energy utilities to create incentives that will promote the installation of water and energy efficiency measures within the commercial, industrial and institutional (CII) sectors throughout Southern California. The study was released in five (5) volumes. These reports can be found by clicking on the following links:
  - a. Volume 1 – Executive Summary:  
<http://www.usbr.gov/lc/socal/reports/weep/Vol1ExecSumm.pdf>
  - b. Volume 2 – Cataloguing CII Customer Classes:  
<http://www.usbr.gov/lc/socal/reports/weep/Vol2CIIcustomers.pdf>
  - c. Volume 3 – Audit Field Guidance Document:  
<http://www.usbr.gov/lc/socal/reports/weep/Vol3AuditGuidance.pdf>
  - d. Volume 4 – Marketing and Outreach Practices Review:  
<http://www.usbr.gov/lc/socal/reports/weep/Vol4MktingOutreach.pdf>
  - e. Volume 5 – Barriers and Incentives Analysis:  
<http://www.usbr.gov/lc/socal/reports/weep/Vol5BarrierIncentives.pdf>
- 4) Handbook of Water Use and Conservation: Amy Vickers, 2001: This extensive handbook explores the potential for water conservation. Commercial conservation is found specifically in Chapter 4, entitled Industrial, Commercial and Institutional Water Use and Efficiency Measures (pages 230 – 327). This book can be checked out from the CUWCC library by members.
- 5) NRDC: Making Every Drop Work – Increasing Water Efficiency in California’s Commercial, Industrial, and Institutional (CII) Sector. This document presents some innovative programs for a variety of CII sectors, and is available online here: <http://www.nrdc.org/water/cacii/files/cii.pdf>.
- 6) Conservation Master Plans: These examples can help water agencies in developing their own conservation plans:
  - a. Though currently in the process of being updated (updated plan will be posted when available), West Basin Municipal Water District’s 2005 master planning effort’s highlights can be found here:  
[http://www.westbasin.org/files/pdf/Conservation\\_masterplanHighlights.pdf](http://www.westbasin.org/files/pdf/Conservation_masterplanHighlights.pdf).
  - b. City of Grand Junction, CO: <http://www.gicity.org/Utilities.aspx?id=2147485826>.

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- 7) The Alliance for Water Efficiency is a stakeholder-based non-profit organization dedicated to the efficient and sustainable use of water. Located in Chicago, the Alliance serves as a North American advocate for water efficient products and programs, and provides information and assistance on water conservation efforts. They have an extensive resource library:  
[http://www.allianceforwaterefficiency.org/Commercial Institutional and Industrial Library Content Listing.aspx](http://www.allianceforwaterefficiency.org/Commercial_Institutional_and_Industrial_Library_Content_Listing.aspx).

## Emerging Issues and Lessons Learned

- 1) Drain line issues: The main issue is the decreased flow of water running through drain lines in commercial buildings. This has become a concern in areas that have seen increases in the number of “low flow” devices and should be considered when dealing with sites with large numbers of fixtures for retrofit. This issue is currently being studied and results from that study are forthcoming. It is a good idea to discuss with site maintenance personnel prior to implementing any changes.
  - a) [http://www.plumbingengineer.com/june\\_10/conservation\\_feature.php](http://www.plumbingengineer.com/june_10/conservation_feature.php)
  - b) <http://www.worldplumbinginfo.com/article/reduced-flush-volume-and-drainline-testing>
  
- 2) Budget cycles: CII sites may have limitations on immediate implementation of projects due to lack of allocated budget for that particular fiscal year. To ensure success, discuss the customer’s ability to include funding for projects in the next budget cycle.
  
- 3) There has been concern over issues of scalding as a result of poorly engineered showerheads that do not mix the hot and cold water lines properly. This may be of concern if looking at hotel/motel sites, fitness centers or any other CII sites that utilize showerheads. For more information, please review the documents listed below:
  - a. Scalding issues given to the Metropolitan Water District on January 20<sup>th</sup>,2011: [Scalding Issues Presentation 1-20-2011](#);
  - b. The American Society of Sanitary Engineering’s paper titled “Scald Hazards Associated with Low-flow Showerheads”: [ASSE scald paper](#); and
  - c. The journal Home Energy published an article by John Koeller in their Jan/Feb 2009 issue on scalding dangers: [Koeller scalding article](#).