California
Department of Water Resources

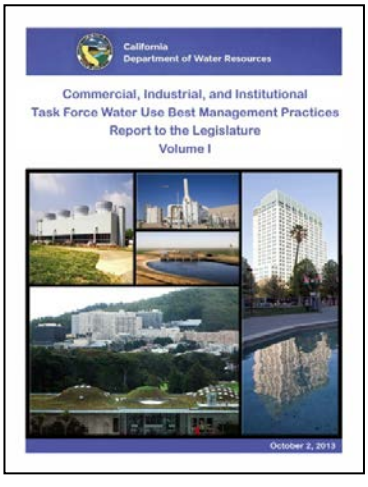
Commercial, Industrial, and Institutional Task Force Water Use Best Management Practices Report to the Legislature Executive Summary

October 21, 2013

This report to the Legislature pursuant to Section 10608.43 of the California Water Code is displayed in two volumes for the reader's convenience.

Navigating Through this Report

Targeted to the general public, the legislature, and other policy makers and managers

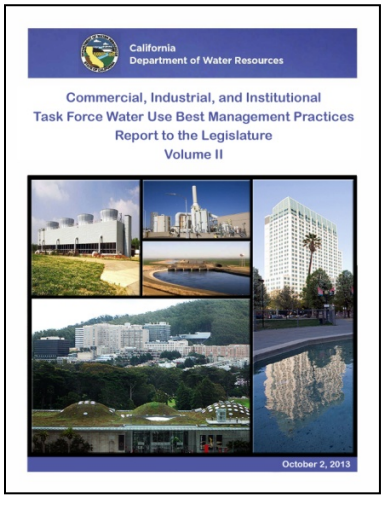


Volume I: A Summary

Sections:

1. Introduction
2. Report Organization
3. Current Water Use and Demand in the Urban Sector
4. Recommended Action Summary
5. Sections 5 - 10, Summary of Volume II

Targeted to those implementing best management practices



Volume II: Technical Information

Sections:

1. – 4. (same as Volume I)
5. Water Use Metrics
6. Technical and Financial Feasibility of Implementing the BMPs
7. Commercial, Industrial, and Institutional Sector BMPs
8. Standards and Codes
9. Public Infrastructure Needs for Recycled Water
10. Evaluation of Institutional and Economic Barriers to Municipal Recycled Water

Appendices A through F

For Ackowledgements see Volume I

Executive Summary

Introduction

This report, *Commercial, Industrial, and Institutional Task Force Water Use Best Management Practices Report to the Legislature*, identifies specific best management practices (BMPs) and actions to support the commercial, industrial, and institutional (CII) sectors efforts to improve water use efficiency and support California's water supply sustainability. It is intended to provide the CII sectors with information on water-saving technologies and BMPs applicable in the CII sectors. The report is also intended for use as a resource for:

- Existing and new businesses, facilities, and institutions
- Developers, consultants, and designers
- Water service providers
- Planning agencies
- Policy makers

Since technology and practices change over time, the information in this report is intended and recommended to be updated periodically.

This report also provides the CII sector with valuable information to capture the multiple benefits of reduced costs for water, energy, wastewater, and onsite water and wastewater treatment facilities. Water efficient landscape BMPs are also included because outdoor water use may represent a significant percentage of CII water use. Recommendations include BMPs, actions for implementation, metrics, and the use of alternate water sources for certain applications.

According to the 2009 California Water Plan Update scenarios, urban sector water use is estimated to increase between 1.5 and 10 million acre-feet per year by 2050. The demands are heavily influenced by assumptions about future population growth and water conservation savings. An increase of 6 million acre-feet per year represents the Current Trend Scenario.

Background

The CII sector is fundamental to California's economy and structure. It employs residents, provides goods and services, and maintains the state's position as a center for technology and innovation. Although California's economy has grown, the water used in the state has remained generally consistent. Increasing water use efficiency, however, is critical to growing and protecting the state's economy and reducing pressures on California's water resources and environmental health.

The California Department of Finance (DOF) estimates that California's population will continue to grow from 37 million people (2010 census), surpassing 40 million by 2020 and 50 million in 2050. The 2009 California Water Plan Update (Update 2009) addressed the variability of population, water demand patterns, environmental patterns, climate, and other factors that affect water use and supply. Incorporating consideration of uncertainty, risk, and sustainability, Update 2009 estimates that urban sector water use will increase between 1.5 and 10 million acre-feet.

DWR estimates that the CII sector accounts for approximately 30%, or roughly 2.6 maf, of total urban water use in California Water Plan Update 2009.

Update 2009 estimated that the annual average water demand is 33.2 million acre feet (maf) for the agricultural sector and 8.8 maf for the urban sector based on the average uses during the 1998 to 2005 time period. Long-term proportional annual demands between 1967 and 2010 are shown in Figure 1-1. These estimates do not include additional state developed water that is allocated, mitigated, legislated, designated, or otherwise used to support the environment.

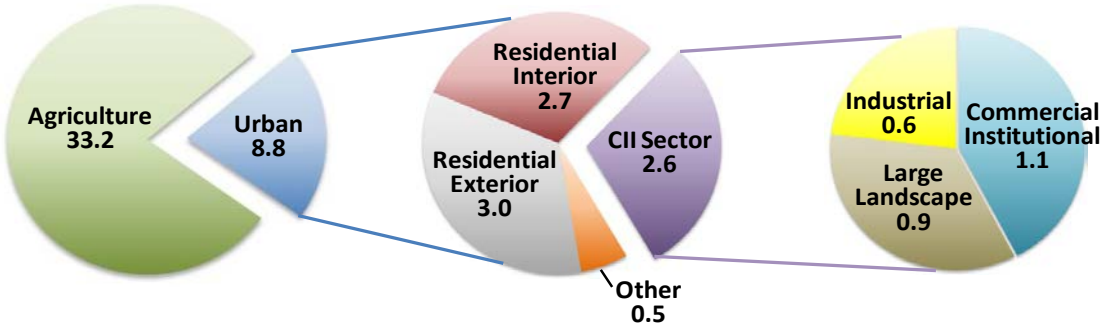


Figure 1-1. Volumetric Breakdown of California Non-Environmental Developed Water Use

To address increasing demands on the State's water supply, Governor Schwarzenegger issued an executive order in February of 2008 that called for a 20 percent reduction of per capita water use in the urban sector by 2020. In November 2009, Senate Bill (SB) X7-7 (Steinberg) made that order a state law by amending the California Water Code (CWC).

"Fortunately, there are numerous cost-effective strategies that can be applied to achieve significant water savings in the CII sector. Estimates indicate that this potential ranges between 710,000 and 1.3 million acre-feet per year".

(Quote from Making Every Drop Work: Increasing Water Efficiency in California's Commercial, Industrial, and Institutional (CII) Sectors 2009 NRDC. Efficiency estimate based on 2003 Pacific Institute analysis in Waste Not, Want Not: The Potential for Urban Water Conservation in California.)

SB X7-7 recognizes that:

- Reduced water use through conservation achieves significant energy and environmental benefits and can help protect water quality, improve stream flows, and reduce greenhouse gas emissions.
- Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Sacramento - San Joaquin Delta.

- The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.

SB X7-7 contains several mandates designed to promote water conservation and efficiency throughout California. One of these mandates directs the Department of Water Resources (DWR), in coordination with the California Urban Water Conservation Council[1] (CUWCC), to "convene a Task Force consisting of academic experts, urban retail water suppliers, environmental organizations, and commercial, industrial and institutional water users to develop alternative BMPs for the CII water sector." CWC (10608.43).

The CII Task Force, in conjunction with DWR, was directed to submit a report to the legislature to address:

- A review of multiple CII sectors with recommended water use efficiency standards.
- Appropriate metrics for evaluating CII water use.
- Evaluation of water demands for manufacturing processes, goods, and cooling.
- Evaluation of public infrastructure necessary for delivery of recycled water to the CII sectors.
- Evaluation of institutional and economic barriers to increased recycled water use within the CII sectors.
- Identification of the technically feasible and cost effective BMPs.

Report Processes

DWR and the CUWCC project management team formed the CII Task Force (Task Force) to develop BMPs, metrics, recommendations, and this report for the legislature. The Task Force members provided the technical information incorporated into this report; reviewed technical material and documents; and, provided comments, data, and supporting information to the DWR and CUWCC project management team who prepared this report. The recommendations in this report reflect a consensus of the Task Force members.

[1] The California Urban Water Conservation Council was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices into the planning and management of California's water resources.

The CII Task Force initially convened in March 2011 and held monthly meetings. Agendas and supporting materials were posted ten days prior to meetings on the CUWCC CII Task Force and DWR Water Use Efficiency websites[2]. Meetings of the CII Task Force were open to the public and were subject to The Bagley-Keene Open Meeting Act of 2004. The public and other interested parties were given an opportunity to comment throughout the process.

The CUWCC and their contractors, under the direction of DWR, drafted the initial documents for the first draft of this report. DWR assembled and edited the first and subsequent drafts.

It is recommended that an advisory group or committee be formed to further analyze and make recommendations regarding the development, use, and capture of pertinent metrics and BMPs.

The Report

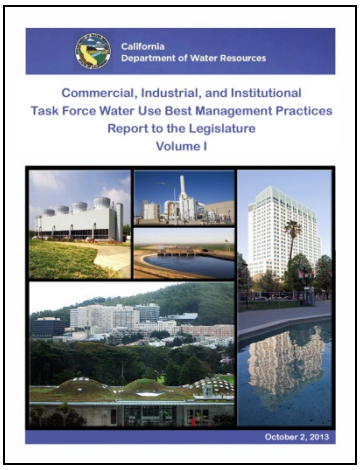
This report is organized on multiple levels to support its use for diverse purposes. It provides a general overview for those interested in the CII BMP concepts, as well as detail for those implementing them. Recommendations also include the use of alternative water sources for certain applications and many of the BMPs may be applied to other business types not specifically addressed herein.

This report includes the following:

- **Executive Summary** – Report highlights.
- **Volume I: A Summary** – This volume contains a summary of the in-depth information provided in Volume II. The targeted audience for Volume I is the general public, the legislature, and other policy makers and managers.
- **Volume II: Recommendations, BMPs, and Technical Background -** This volume contains the fully-developed, technical report prepared by the CII Task Force team and the full recommendations of the CII Task Force. Volume II also includes the report appendices, which provides supplemental information the glossary, case studies, and references. This volume is targeted to those who would implement the BMPs and are interested in a more technical discussion.

[2] http://www.cuwcc.org/2column.aspx?id=16620 and www.wateruseefficiency/sb7

Both Volumes I and II are prepared as stand-alone documents; however, references and appendices are only included in Volume II. Each volume contains identical sections, but the technical sections are only briefly summarized in Volume I.



The introductory sections are the first four sections of each volume. They are the same in both volumes, except for references which are found only in Volume II, and provide information critical to any reader of this report. The introductory sections are:

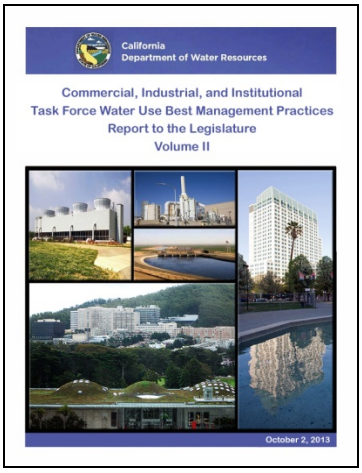
1. Introduction
2. Report Organization
3. Current Water Use and Demand in the Urban Sector
4. Recommendation Actions Summary

The technical sections (Sections 5.0 through 10.0) follow the introductory sections in both volumes. However, the level of detail in the technical sections differ between the two volumes. Each section in Volume I is a brief summary of the more detailed information contained in Volume II.

For the reader's convenience, this report is displayed in two volumes. Volume I provides a summary of the material presented in greater detail in Volume II, which includes the Appendices and Case Studies.

The technical sections are:

5. Water Use Metrics and Data Collection
6. Technical and Financial Feasibility of Implementing the BMPs
7. Commercial, Industrial, and Institutional Sector BMPs
8. Standards and Codes for Water Use Efficiency
9. Public Infrastructure Needs for Recycled Water
10. Evaluation of Institutional and Economic Barriers to Municipal Recycled Water Use



The BMPs are the highlight and focus of the CII Task Force Report and they are presented in three locations within the CII Task Force Report:

- **Volume I** – A brief overview of how the BMPs were developed and a summary list of what BMPs are included.
- **Volume II** – A fully developed, detailed discussion of each BMP, including relevant information for implementation.
- **Appendix A** – A BMP list and description only, without background information.

The glossary of terms is included in Appendix B. Selected case studies describing water savings efforts currently being implemented in California are included in Appendix C. These and each of the other appendices are included in Volume II.

Task Force Recommended Actions Summary

This report explores a range of issues associated with water use and efficiency opportunities within the CII sector and provides recommendations including:

- **Best Management Practices (BMPs)**
- **Best Available Technology (BAT)**
- **Recommendations for actions**
- **Metrics for evaluating water use**
- **Recycled water and alternative supplies**

The "Task Force Recommended Actions Summary" section of this report provides direction on how noted tasks can be accomplished, plus a list of potential recommended legislative actions and next steps.

The recommendations found in this report provides direction, procedures, and actions to formalize and ensure implementation; verify and report on implementation; and, adopt changes as practices and technologies improve. Recommendations also include next steps and a list of potential legislative actions.

The CII Task Force furthermore recommended participation by the State legislature, State agencies, industry groups, CII entities, water agencies, wastewater agencies, environmental groups, and other stakeholders throughout the BMP implementation process .

The metric section provides a conceptual understanding and approach to establish appropriate metrics for evaluating water use efficiency and productivity in the CII sectors, and to identify the savings potential from implementation of the CII BMPs in California. The usefulness and feasibility of metrics are tied to the availability and reliability of data. This section addresses the need for consistent and reliable water use data collection, reporting, and monitoring. A summary of recommended actions can be found in Volume I, Section 5.0 with a detailed description in Volume II, Section 5.0.

Throughout the BMP implementation process, it is important to remember that each CII site is unique, and accordingly, the approaches to implementing BMPs and determining metrics and cost-effectiveness need to consider that uniqueness.

Throughout the BMP implementation process, it is important to remember that each CII site is unique, and accordingly, the approaches to implementing BMPs and determining metrics and cost-effectiveness need to consider that uniqueness.

Water use comparisons between various business sectors or between individual businesses are best applied within an individual business or customer due to their unique site-specific characteristics.

A wide range of BMPs have been developed to focus on technical advancements and improved practices that will increase the efficiency of water use in the CII sectors. A detailed discussion and recommended specific BMPs that could be

implemented for the various CII sectors are summarized in Volume I, Section 7.0 and described in detail in Volume II, Section 7.0 and Appendix A.

Key issues in the CII Task Force Report address how non-potable water sources can be obtained and incorporated into CII applications. These issues are considered in Section 7.0 (alternate water supplies and specific BMPs, Section 9.0 (infrastructure limitations for obtaining municipal recycled water), and Section 10.0 (barriers and solutions for CII use of municipal recycled water). Recommended actions regarding recycled water can be found summarized in Volume I, Sections 9.0 and 10.0, which include legislative, financial, regulatory, and operational mechanisms for increasing non-potable water use in CII applications. Detailed recycled water recommendations with options can be found in Volume II, Sections 9.0 and 10.0.

A wide range of BMPs have been developed to focus on technical advancements and improved practices that will increase the efficiency of water use in the CII sectors.

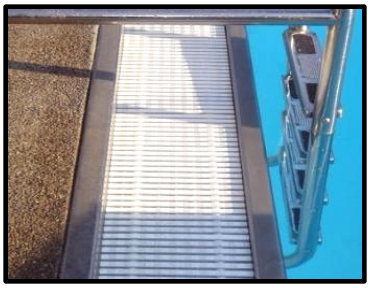
Best Management Practices (BMPs)

A wide range of BMPs are available to improve the efficiency of water use within the CII sectors and are summarized in Volume I and detailed in Volume II and Appendix A. These BMPs include new technologies and improvements in water management. Implementation of these BMPs could be facilitated by all stakeholders implementing the following **recommendations**:

- Endorse and adopt a formal process and commit to ongoing support for CII water conservation measures to address issues identified in this report.
- Share and promote the importance of BMP implementation with CII businesses and the general public.
- Conduct state-wide workshops in coordination with industry organizations.
- Provide technical and financial assistance and advice to those implementing the BMPs.
- Develop a mechanism for reporting progress that could include:
    - Periodic reports to the legislature through DWR or other designated entities.
    - Inclusion of progress reports in CUWCC reports to the State Water Resources Control Board (SWRCB).
    - Inclusion of progress reports in urban water service provider Urban Water Management Plans (UWMPs).

The recommendations presented and the information or conclusions summarized in this section are identical to those in Volumes I and II.

- Develop local, sector specific, and statewide approaches to track the success and effectiveness of BMP implementation efforts and water savings results.
- Develop a mechanism(s) to update the CII BMPs as practices and technologies improve.
- Identify assurance mechanisms that aforementioned critical issues are addressed.



Implementation of Cost Effective BMPs

CII water users should perform audits to identify opportunities for implementing all cost-effective BMPs. Following audits, they should calculate the cost-effectiveness of various measures and factors such as:

- Projected water and wastewater cost savings over time.
- Energy savings and changes in operation and maintenance costs including changes in water, wastewater, energy, waste disposal, pre-treatment, chemical, and labor costs.
- Implementation cost.
- Potential incentives available.
- Water supply reliability benefits.

Water service providers (and energy utilities) should incorporate audits into their conservation programs, consider financial incentives for BMP implementation, and provide other technical assistance as appropriate.

The CUWCC should continue to update their BMPs for water service providers' CII conservation programs and technologies to incorporate the CII BMPs, audits, and cost-effectiveness assessments. All CII water users should also consider and re-evaluate implementation of recommended BMPs at the time of equipment installation or construction improvements.

Specific BMPs that could be implemented for the various CII sectors are summarized in Section 7.0 Volume I and described in detail in Section 7.0 and Appendix A of Volume II.

Metrics and Measuring Progress

This section does not currently recommend any single metric for use in all CII sectors. Furthermore, the CII Task Force cautions against setting regulatory minimum standards for water use efficiency metrics that would be applicable to specific CII establishments, sectors, or subsectors. Even within subsectors, because of the variability in the types of products made or services provided and the many confounding factors in how water is used, it would be difficult to set uniform standards across CII establishments (defined as individual CII use sites).

The Task Force found that there is limited centralized data concerning how much water is used in the CII sectors. Moreover, the data that does exist is tracked inconsistently at the local level.

The Task Force agreed upon the following recommendations on the development and use of metrics to evaluate water use, and on an approach to improve data collection and reporting in California.

The recommendations presented below are identical to those given in Volume I, Section 5.0 and stem from the information or conclusions found later in Section 5.0, Water Use Metrics and Data Collection in Volume II of this report.

Recommendations

- CII establishments should use metrics to improve and track their water use efficiency over time. Where norms or ranges are available, establishments should compare their metrics to those norms.

- CII associations, water service providers, and the CUWCC, among others, should provide tools, guidance, and training to their constituents and customers on BMPs and the establishment and use of metrics-based benchmarking to demonstrate improved water use efficiency over time.

- Organizations such as the U.S. Environmental Protection Agency or CUWCC should develop software for voluntary and anonymous water use reporting and trending, using an approach similar to Energy Star's® Portfolio Manager. This data can then be used to develop norms for CII water use.

- Manufacturers of equipment and products, CII associations, CII establishments, utilities, and the state should set efficiency standards for certain water use devices and equipment similar to existing device standards for commercial pre-rinse spray valves and clothes washers.

- The CUWCC, water service providers, energy utilities, and CII associations should collect and compile data on market penetration levels for installation of particular devices or practices for which industry or regulatory water use efficiency standards exist.

- DWR should continue to develop appropriate efficiency or productivity metrics for the CII sector at the statewide level to determine and monitor subsector water use and progress toward improving water use efficiency over time.

Data Collection and Reporting Recommendations

Recommendations 7 and 8 are intended to make improvements in data collection.

- DWR should work with the Association of California Water Agencies (ACWA), CUWCC, California Urban Water Agencies (CUWA), California Public Utilities Commission (CPUC), California Water Association (CWA), and American Water Works Association (AWWA) to develop a full-spectrum, water-centric standardized classification system of customer categories. This classification system should include consistent use of North American Industry Classification System (NAICS) codes and assessors' parcel numbers (APNs).

- DWR, in consultation with a stakeholder advisory committee utilizing a public process, should develop a system and implementation plan for water production, delivery, and use data collection, which includes the classification system for reporting and tracking at the user, water service provider, state, and federal levels. One or more of the following options should be considered:

  - DWR should develop a water-centric water use and user classification system.
  - Water service providers should classify water users via a common classification system and transition their customer databases to incorporate this system.
  - Water service providers should consider recording and maintaining key data fields, such as APN's, for customers. This would enable the linking of water usage data with information from other sources for purposes of metrics, water demand analysis, and demand projections.
  - Water service providers and self-supplied water users meeting defined criteria should be required to report water use to the state.
  - Water service providers, CUWCC, and water users should expand on landscape irrigation water use categorizations that recognize and promote BMPs for separate metering, especially for larger and mixed use sites.

"Full-spectrum" is a water use classification term denoting the complete range of water uses and users such that a classification system will have utility across different water planning or management functions at various levels of government and water service providers.

"Water-centric" is a water use classification term to describe a system being designed around and central to water uses and users, in contrast to characterizing economic activity, water billing functions, or other factors.

Technical, Financial Feasibility and Potential Water Use Efficiency Improvements for BMPs and Audits

The Legislature also called upon the CII Task Force to develop "an assessment of the potential statewide water use efficiency improvement in the commercial, industrial, and institutional sectors that would result from implementation of these best management practices" (CWC section 10608.43)

A statewide assessment of water use savings was challenging, as described in Section 6.0 of Volume II, but examples of water savings accomplished in specific applications are presented in this section along with an approach based on the penetration rate for a BMP discussed in Section 6.0 of Volumes I and II.

Water audits have been found to be effective in assisting managers of CII entities to identify areas of inefficient water use within facilities and the appropriate BMPs necessary to reduce water use. A discussion of audits concludes section 6.0 in Volumes I and II.

The recommendations presented below are identical to those given in Volume I, Section 6.0 and stem from the information or conclusions found later in the Section 6.0in Volume II of this report.

This topic is summarized in Section 6.0 of Volume I with a more detailed description in Section 6.0 of Volume II. Each section begins with CII Task Force recommendations

Recommendations

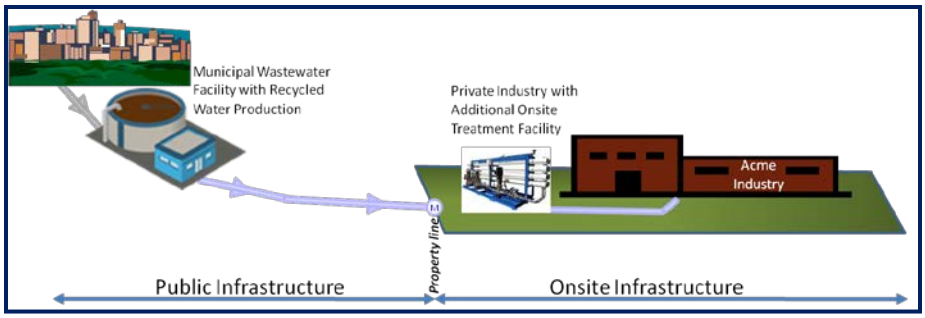
- CII entities should perform water audits to identify opportunities for implementation of BMPs.
- Following audits, CII entities should evaluate the technical and financial feasibility of BMPs to determine whether to implement BMPs.
- Water and energy service providers should incorporate water audits into their efficiency programs, consider financial incentives for BMP implementation, and provide other technical assistance as appropriate.
- In organizations representing business, industry, and water service providers, the CUWCC and DWR should educate CII businesses on the BMPs and approaches to doing audits and performing a cost-effectiveness analysis.
- All new water users should consider implementing the recommended BMPs at the time of installation or construction.

Overall, these recommendations include legislative, financial, regulatory, and operational mechanisms for increasing non-potable water use in CII applications.

- When replacing equipment, CII business should evaluate the equipment maintenance and operational practices needed to achieve an industry standard of water use efficiency for the new equipment

Recycled Water and Alternative Supplies

Key issues in the CII Task Force Report address how non-potable water sources can be obtained and incorporated into CII applications. These issues are considered in Sections 7.0 (alternate water supplies and specific BMP), Section 9.0 (infrastructure limitations for obtaining municipal recycled water), and Section 10.0 (barriers and solutions for CII use of municipal recycled water). Overall these recommendations include legislative, financial, regulatory, and operational mechanisms for increasing non-potable water use in CII applications.



The following actions should be taken to encourage more aggressive use of recycled water and alternative water supplies by CII businesses:

- Improve regulatory and statutory requirements to overcome barriers to potable and non-potable recycled water use in a manner that is protective of public health and water quality.

- Encourage the State Building Standards Commission to consider national and international codes and to:

    - Periodically update and expand the plumbing code.
    - Address alternative water supplies.

- Encourage financial and technical assistance to increase recycled and alternative water use.

- The California Energy Commission (CEC) should consider allowing offsets for the use of recycled water at power plants. Under an offset program, where it is not feasible to use recycled water at a power plant, a power plant operator would be allowed to provide funding to expand recycled water at another location.

Legislative Opportunities

Opportunities for State legislation in assisting implementation of the CII Task Force BMPs and other recommendations include:

- Providing the state with a mechanism and the authority for collecting detailed water use data in the private and public agency sectors for the purpose of tracking the progress of statewide CII sector water use and implemention of the CII BMPs and recommendations of this report. This can be reported back to the legislature and assist DWR in quantifying urban water use for the California Water Plan Update.
- Providing support and state funding for the implementation of recommendations in this report, including water conservation programs and recycled water projects commensurate with benefits to the state, and overcoming financial barriers toward expanded use of recycled water.
- Improving statutory requirements, as appropriate, to overcome barriers to potable and non-potable recycled water use in a manner that is protective of public health and water quality.
- Promoting plumbing code updates to encourage development and use of alternative water supplies and implementation of cost-effective BMPs.

Some of the opportunities for State legislation in assisting implementation of the CII Task Force BMPs and other recommendations include; providing additional funding to implement the recommendations of this report, and providing authority to collect water use data and improving statutory requirements to overcome barriers to recycled water.

Next Steps

To help assure that the work of the CII Task Force benefits the State of California, CII water users, water service providers, wastewater agencies, energy utilities, climate action plans, the environment, CII stakeholders, and others, including DWR and CUWCC, should:

- Commit to ongoing support for CII water conservation measures.
- Identify a mechanism to ensure these critical issues are addressed going forward.
- Develop a mechanism for reporting on progress that could include:
    - Periodic reports to the legislature through DWR or other designated entities.
    - Inclusion of progress reports in CUWCC reports to the SWRCB.
    - Inclusion of progress reports in urban water supplier UWMPs.
- Ensure a process to address these issues is in place and is initiated by the end of 2014.