BEST MANAGEMENT PRACTICE: WATER CONSERVATION

COMMERCIAL AND INDUSTRIAL CONSUMPTION AUDITS

Commercial/Industrial (C&I) customers are significant users of water and typically represent a water system’s largest accounts. As such, targeting C&I customers for water efficiency improvements may be a cost effective component of an overall demand management strategy.

C&I water use audits quantify indoor and outdoor water use at a facility, to identify opportunities for water efficiency improvements. Benefits from implementation of this BMP may include lower utility costs, energy savings, and reduced process costs. Not to be underestimated are both the public relation value of being perceived as an “environmental steward” and setting a good example for others to emulate.

APPLICABILITY

This BMP is intended for water systems to help reduce overall demand as well as for C&I water users to increase water efficiency at their facilities.

Under this suggested BMP, the utility identifies and ranks C&I accounts according to consumption and the highest conservation potential. A marketing strategy to promote the audits should be developed. The strategy may consist of letters, telephone calls or personal visits that offer specific incentives to entice C&I customers to participate in the audits. Incentives may include awards for gains in efficiency or potential rebates for implementation of efficiency measures.

C&I accounts are defined as follows:

- Water users that provide or distribute a product or service, such as hotels, restaurants, office buildings, commercial businesses or other places of commerce;
- Water users that are primarily manufacturers or processors of materials;
- Institutional Water users dedicated to public service. These include schools, churches, hospitals, and government facilities.

Once the scope of service is determined, there are multiple options for conducting the water audits. Although utility staff may be trained to conduct onsite C&I audits, it may be more appropriate for this type of survey to be conducted by an outside contractor due the complexity of the audit for many facilities. In addition water audit software may be used in order to provide in-depth printed water audit reports for customers.

DESCRIPTION OF AUDIT

Commercial and industrial consumption audits include accurate measurement of all water entering and leaving the facility, an inventory and calculation of all on-site water consumption, calculation of water related costs, and identification of potential water efficiency measures. The information from the water audit should then form the basis of a comprehensive conservation program to implement specific water saving measures throughout the facility.
Water-use surveys should include a site visit; an evaluation of all water-using equipment and processes; a report identifying recommended conservation measures and their expected payback; and a summary of available utility incentives.

An effort should be made by the auditor to collect as much information as possible prior to conducting the onsite water audit. This information may include:

- Facility maps with building sizes;
- Locations and descriptions of all water sources, transfers, and destinations;
- Locations of all water meters and the most recent calibration date;
- Numbers of employees and work schedules, hours of operation;
- Inventories of plumbing fixtures;
- Inventories of water using equipment and processes including cooling water functions, once through vs. closed loop, and water quality limitations;
- Consumption and water quality data for the previous three years;
- Prior water or energy audits;
- Outdoor consumption information including irrigation schedules; and
- Size of landscape.

The on-site survey should identify and verify all equipment that uses water, noting discrepancies to update the inventory. Equipment information such as the hours of operation and manufacturers' listed flow rates should be verified and recorded. Daily water use for each major water-using process should be determined and total facility usage calculated on a monthly basis.

Generally, water use at C&I facilities may be broken into six discrete categories:

- Heating
- Cooling
- Process
- Product ingredient
- Sanitary use
- Outdoor water use

If consumption for irrigation represents a significant portion of demand, more detailed information on landscape irrigation and outdoor consumption should be collected. When applicable, a determination of irrigation schedules from irrigation controllers should be made along with a run of the irrigation system to measure the distribution efficiency as well as to identify leaks and broken heads. Many times an irrigation system isn't actually necessary. As an example, some office parks may be able to
convert some or all of their turf lawn to native plants which need little or no supplemental watering once established.

**DATA EVALUATION**

The initial data gathering, coupled with the onsite survey, should be incorporated into a facility audit report that includes consumption observations, an analysis of water use, and costs for each major water-using process. Areas for water efficiency improvements through engineering or change in business practice should be identified.

The report should highlight water efficiency opportunities that are cost effective to implement. An effort should be made to generate the payback period for each efficiency measure suggested in the report. This payback period should factor the true cost of water including energy, treatment, and disposal of related costs.

The report may also consider water efficiency opportunities, even if not cost effective as they may be implemented due to high visibility, ease of implementation, or general employee and customer goodwill. The audit report may be considered the first step in preparing a water conservation plan for implementation by the customer.

**DETERMINING WATER SAVINGS**

The cost effectiveness of each recommendation should also be determined by the facility, utilizing its own criteria for making capital improvement or decisions. In some instances, implementing a recommendation may require a large capital expenditure. However it is important to carefully consider the payback period as many retrofits may pay for themselves in just a few years. Some water savings opportunities found by the audit may require only minor capital expenditures or a slight modification to current business practice and should be done simply as a matter of good practice.

Examples of areas where potentially significant C&I water savings may be achieved include:

- Converting cooling systems from once-through to closed loop
- Replacing water cooled equipment with air cooled
- Installing point of use water heaters in employee bathrooms vs. conventional domestic hot water tanks
- Recovering process water, cleaning it and reusing it
- Reducing or eliminating unnecessary outdoor watering
- Develop alternative sources of water for some uses (i.e., rooftop rainwater harvesting for landscape irrigation or other non-potable needs
- Installation of low-flow fixtures not only in the traditional C&I sector, but also in institutional facilities or sites having numerous bathrooms

Routine assessment of water use may reveal areas where measures are successful or ineffective. This may also indicate where modifications to the program are required. The utility should conduct periodic follow-up visits to evaluate the status of recommended water-savings.
**IMPLEMENTATION**

The utility should identify C&I accounts and identify and prioritize according to consumption, highest conservation potential, cost-effectiveness or ease of program implementation.

A strategy involving marketing of C&I consumption audits which may consist of letters, telephone calls or personal visits should be developed in order to target the most appropriate C&I customers. Offering incentives such as awards for most water consumption reduction, best drought-tolerant or native landscape, etc. may entice C&I customers to participate in water-use audits.

C&I Consumption audits will consist of:

- **On-site walk thru of facility**
  - inventory and verification of all water-using equipment
  - total facility water usage determined and calculated
  - survey of irrigation system if applicable

- **Compilation of C&I consumption audit report**
  - includes analysis of consumption/costs
  - identification of potential opportunities for water savings
  - prioritization and summary of the most cost effective recommendations

Presentation of findings, as may be appropriate (aka “Debrief” session)

Recommended Action Plan as a result of presentation of findings

**DOCUMENTATION**

Establishing baselines and gauging progress is necessary for the water system to determine the success of water audit initiatives and to encourage additional participation. Measurable goals, such as consumption reduction (in terms of percentage of baseline water usage) are useful for later evaluation of the conservation plan and planning of future initiatives.