

## Generic Water Conservation Measures

The development of generic water conservation measures is being considered within the context of the Compact language, wherein each of the states is obligated to develop Environmentally Sound and Economically Feasible Water Conservation Measures (ESEFWCM).

By definition ESEFWCM are measures, methods, technologies or practices for efficient water use and/or the reduction of water loss and waste. ESEFWCM are required to be environmentally sound, reflect best practices, be technically feasible and available, economically feasible and cost effective. Factors to be considered include the facilities and processes, the environmental impact of the water use, age of equipment and facilities, energy impact and other appropriate factors. The goals as outlined in the Compact for ESEFWCM are as follows:

- Ensure improvement of water and water dependent natural resources
- Protect and restore hydrologic and ecosystem integrities
- Retain the quantity of surface and ground water
- Ensure for the sustainable use of waters
- Promote efficient use and reduce waste

The challenge to developing generic water conservation measures (GWCM) is to find underlying measures, methods, technologies and practices that are uniformly applicable to all water use sectors and achieve the above mentioned goals.

### Development of Generic Conservation Measures

Staff of the Water Bureau, Water Use and Water Withdrawal Program (WUWWP) reviewed conservation measures submitted by various water use sectors in accordance with Section 32708a of Part 327 of Act 451. Sector specific conservation measures were submitted by the following:

Organization	on behalf of	Water Use Sector
Michigan Aggregates Association (MAA)		Aggregate Industry
Michigan Turfgrass Environmental Stewardship Program		Non-agricultural Irrigation
Michigan Section of American Water Works Section (MiAWWA)		Public Water Supply Sector
Michigan Chamber of Commerce (MCC)		Electric Utilities
		Chemical Manufacturing
		Pharmaceuticals
		Pulp and Paper
		Beverages
		Cement Manufacturing
Michigan Department of Agriculture		Agricultural Irrigation

The submitted documents were reviewed and compared in an attempt to identify factors, activities or considerations that might be considered common to all sectors. From this review the subsequent guidelines for generic water conservation measures were developed based upon the “themes” common to all water use sectors.

The water conservation measures that appeared to be the most comprehensive expressed as a common theme the need to address four specific areas. The areas were an understanding of water use, a scheme for effectively managing water use, the need to properly optimize and

maintain the water use system(s) and the actual implementation of water conservation measures. Each of these areas is expanded upon in subsequent discussions.

### **Understanding Water Use**

Understanding water use focused on aspects from pre-construction design to installation considerations. Best management practices for non-agricultural irrigation identified the need for a site assessment of where water was to be used, the laying out of ground work for efficient and uniform distribution in water use, and provisions to assure system integrity. The development of an operational manual and a comprehensive description of the system was also deemed critical including the identification of valves and shut-offs

The MCC submitted conservation programs for the various sectors that had an emphasis on understanding facility water use, development, evaluation and documentation of proposed management practices. In all instances the importance of water conservation from a cost-benefit perspective was stressed. Important factors identified in the plans included the identification of significant water use processes, operations and equipment. There was also an emphasis placed not only on where water would be used in the facility, but to have an understanding of where water might be lost or discharged from processes and unavailable for reuse. An identification of critical locations for water use tracking through metering and leak detection was also deemed important.

### **Managing Water Use**

One aspect identified as critical was the assignment of an individual to take responsibility for the management of water resources. Across virtually all sectors water use scheduling and the monitoring of actual use was identified as an important program component. It was deemed necessary that all scheduling and monitoring aspects of water use be documented through record keeping, including the documentation of technical improvements and upgrades.

Another component of the water use program identified as important was the conducting of water audits. There should be a plan to periodically conduct water audits. The water audits should provide some consistency between water use and areas of water loss at a facility. Addressing the discrepancies between the two should be considered a means of providing more efficient water use.

### **Maintain Water Use Systems**

All sectors submitted plans containing water system maintenance as a key component of water conservation. Water system maintenance necessitates a program to provide routine inspections and the timely repair of system deficiencies. Routine inspections should be geared to identifying leaks, targeting needed system upgrades and replacement of obsolete water use system components.

While certain aspects of efficient water use were considered across multiple sectors there were some considered critical to a good water conservation program. This is especially true with the identification of leaks. In a public water supply system a water main break may cause enough of a public disturbance the leak is obvious. It may manifest itself as the loss of water service in an area to the extreme of road right-of-way washouts and the undermining of paved roads. Internal losses through leaks within a facility may be much less obvious and considerably more difficult to identify. Accordingly, a solid leak detection program should include metering at critical water use and water discharge points and periodic audits to get a more accurate accounting of water use within the facility.

A review of the sector information submitted suggests a two pronged approach to system upgrades. On the one hand there were a number of upgrades characterized by the simple

alteration of existing processes. The MCC submittal cited examples such as shutting off process water when not in operation, installation of timers on faucets and nozzles and the installation of flow restrictors. More complex approaches were the operating of pumps to match facility process needs, the altering of pump intake designs, changing pump speed to attain desired flow rates, the calibration and cleaning of equipment to enhance thermal and/or hydraulic performance, improvement of rinse cycles through the use of cascading and counter current technologies, and the use of chemical treatment to reduce water use. Within this category, virtually all facilities might benefit from the installation of minor improvements such as low flow toilets.

Physical changes to the system are the second approach and are characterized by significant replacement of system components to enhance efficiency and either reduce water use or eliminate the water use all together. Examples include reducing water use might by the replacement of once-through cooling equipment with reclamation or recirculation systems. The elimination of water use might be attained by retrofitting of once through cooling water apparatus with a closed-loop system, or the replacement of water-cooled equipment with air cooled equipment. The watering of grounds or agricultural irrigation might include a switch from the higher water consuming spray irrigation to the more conservative drip irrigation. Where the watering of grounds is involved landscaping that requires less water by minimizing run-off is important, including the use of drought resistant plants.

### **Implementation of Water Conservation Measures**

There are many activities one might undertake to improve water conservation that for the purpose of discussion might be included as an implementation measure or fit in the preceding section on system maintenance. The major difference is that system maintenance involves physical changes in equipment while implementation is measured more by the commitment of the facility or business to water conservation.

Promoting conservation may take various forms depending upon the type of water use. The public water supply sector may promote water conservation by what one might consider voluntary education and outreach, or punitive measures. In the former, water conservation is promoted by the development of educational material that is included as part of the billing operation. Public education and outreach may be taken up in local schools, through community programs, workshops and local committees to promote water use conservation. They may laude and promote strategies for efficient water use landscaping, installation of efficient plumbing and appliances and distribution of related educational materials to the public.

The "punitive" approach might include full cost pricing for larger users while extending lower water rates to those conserving water. A higher water rate may be charged during periods of peak use to promote conservation. And last, a public water supply may even impose water use restriction. This latter option is done in only the most extreme circumstances as selling water is ultimately the goal of the public water supply.

Consider on the other hand those facilities where water use does not directly generate revenue but represents a cost that must be absorbed in facility operation. In this case education and outreach is again the key although its emphasis is different. Saving water provides a direct operational benefit to the facility. Activities could include the incorporation of water conservation measures into company policies and procedures and in employee training. The posting of water conservation information in public areas was mentioned by many. The incorporation of water conservation into facility quality assessment and quality control was also mentioned. Interestingly, none of the sectors identified any kind of defined incentive for the identification of processes that could be easily altered and result in a significant reduction in water use.