

## Learner's Guide

### Water Efficiency: Planning and Implementation Seminar

Instructor:

Kate McMordie Stoughton  
Pacific Northwest National Laboratory

FEMP Content Expert:

Will Lintner

Program #3

Broadcast Date: April 1, 2010

**Seminar:**  
**Water Efficiency: Planning and Implementation**

Background on the FEMP First Thursday Seminars

The First Thursday seminars are designed for Federal Energy Managers but are open to anyone whose scope of responsibility involves influencing decisions to increase energy efficiency, conserve water resources, and meet other Federal sustainability goals.

There are three ways to participate in the seminars.

1. Live streaming video available on the day of the event over the internet to a desktop computer or via a projection system in a conference room;
2. Digital and Analog Satellite downlink technology for group showings; and,
3. Archived streaming video available after the event over the internet on a desktop computer or via a projection system in a conference room.

To learn more about accessing specific seminars, access <http://www.femp.energy.gov/training>.

**Introduction to the Seminar “Water Efficiency: Planning and Implementation”**

The seminar “**Water Efficiency: Planning and Implementation**” is being offered live on Thursday, April 1, 2010 at 1:30 p.m. Eastern Time. For access and other course information, access: <http://www.femp.energy.gov/training>.

**Water Efficiency: Planning and Implementation** provides an overview of strategic planning for water management, providing viewers an overall process for developing and implementing a water efficiency program. Discussed in the seminar are:

- the regulatory basis and Executive Orders concerning water efficiency including Executive Order 13514;
- establishing baseline measurements;
- determining end uses of water;
- walk through surveys;
- understanding your water bill;
- water saving technologies;
- landscaping and irrigation resources;
- cooling tower efficiencies;
- water reuse;
- leak detection;
- water efficiency financing options; and,
- drought management.

The seminar will last 90 minutes.

## Audience

Water Efficiency is designed for new Federal energy managers and other new energy and environmental professionals who are relatively new to the field and want an introduction to water efficiency.

## Learner Objectives

After completing this seminar, you will be able to:

1. Access relevant Legislation and Executive Order requirements as they apply to water efficiency.
2. Determine how you will establish baseline measurements to determine your current water use.
3. Understand the basics of walk through surveys.
4. Understand your water bill.
5. Build a strategy for increasing water efficiency in your facility including indoor water use, landscape irrigation, cooling towers, water reuse, and leak detection.
6. Consider various options for financing water efficiency projects.
7. Understand the importance of proactive drought management planning.

## Further Training In Water Efficiency

If you would like to learn more about water resource management after completing the First Thursday seminar, **Water Efficiency: Planning and Implementation**, consider taking a web-based, self-paced water training developed by Pacific Northwest National Laboratory hosted by FEMP which covers the topics in First Thursday Seminar in more detail. You may access it at via the following link: <http://femptraining.labworks.org/>.

This course provides a comprehensive overview of water management and is made up of 11 modules. The modules present text-based information across a series of pages that include topical information, links for additional information, and graphics to highlight key points. This online course will focus on the following topics:

1. Legislative Overview
2. Water Management Planning
3. Cost of Water/Wastewater Calculation
4. Water Auditing and Water Balance
5. Water Efficiency – Getting Started
6. Facility Indoor and Outdoor Water Efficiency
7. Process Water Efficiency
8. Alternate Water Sources
9. Water Metering
10. Water Project Economics and Financing
11. Resources and Links

## Further Detail on Presentation Materials

This section of the Learner's Guide is not meant to provide comprehensive information on water management, but is intended to supplement specific slides in the seminar. Not all topics covered in the seminar provided adequate level of detail to understand the basics of the topic. Therefore, this section gives additional resources and examples to illustrate the points made in the seminar.

## Regulatory Basis for Water Efficiency

*Reference Slides 7 and 8: Federal Legislation and Regulations for Water Efficiency*

### The Energy Policy Act of 2005

The Energy Policy Act of 2005, signed into law by former President Bush on August 8, 2005. Subtitle A, Federal Programs, reestablishes a number of Federal agency goals and contains relevant, amended portions of the National Energy Conservation Policy Act (NECPA). Below are the sections pertinent to Federal sector water use.

- Retention of Funds: An agency may retain any funds appropriated to that agency for energy expenditures, water expenditures, or wastewater treatment expenditures, at buildings subject to the requirements of section 543(a) and (b), that are not made because of energy savings or water savings. Except as otherwise provided by law, such funds may be used only for energy efficiency, water conservation, or unconventional and renewable energy resources projects. (section 102)
- Energy Savings Performance Contracts (ESPC): Legislation expands ESPC authority to cover water and wastewater efficiency improvements and further allows the bundling of energy and water projects. (section 105)
- Performance Standards: These standards require "where water is used to achieve energy efficiency, water conservation technologies shall be applied to the extent that they are life-cycle cost effective." (section 109) ESPCs are discussed further in Module #9.
- Equipment Standards:
  - o Commercial pre-rinse spray valves cannot exceed 1.6 gpm (section 135)
  - o Clothes washers must meet efficiency standards (water factor cannot exceed 9.5 gal/ft<sup>3</sup>) (section 136)
  - o Automatic ice makers must meet efficiency standards (sliding scale based on ice harvest rate) (section 136)

### The Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 (EISA), was signed into law by former President Bush on December 19, 2007. Title IV of the Energy Independence and Security Act: Energy Savings in Buildings and Industry, Sec. 432 Management of Energy and Water Efficiency in Federal Buildings Amends Sec. 543 of NECPA and adds the following provisions:

- Facility Evaluations Comprehensive evaluations (including re-/retrocommissioning) of 25% of covered facilities each year are required, so that an evaluation of each such facility is completed at least once every 4 years
- Water Efficiency Implementation: Bundling of individual measures (energy and water) of varying paybacks into combined projects is permitted
- Web-based Tracking: Use of a web-based tracking system to certify compliance for energy and water evaluations, implementation and follow up of measures is required - results to be reported to Congress, other Federal agencies, and the public

- Combining Funding Sources: Authorization for agencies to use appropriations, private financing, or the combination of appropriations and private financing to comply with this section is allowed, and permits agencies to retain the full amount of energy and water cost savings obtained from utility incentive programs.
- Requires metered buildings that are subject to the provisions of EISA (covered facilities) to be benchmarked.

## Executive Order 13514

Executive Order 13514 signed by President Obama on October 5, 2009, directs Federal agencies to further reduce water consumption beyond E.O. 13423, which extends the 2% per year water use intensity reduction requirement to 2020. The key water efficiency related provisions in the Executive Order are as follows:

- Reduce potable water consumption intensity 2% annually through fiscal year (FY) 2020, or 26% by the end of FY2020, relative to a FY2007 baseline.
- Reduce agency industrial, landscaping, and agricultural water consumption 2% annually, or 20% by the end of FY2020, relative to a FY2010 baseline.
- Identify, promote, and implement water reuse strategies consistent with state laws that reduce potable water consumption
- Implement and achieve the objectives identified in the stormwater management guidance issued by the Environmental Protection Agency (EPA)

As of October 2009, the Federal Energy Management Program is developing guidance that will provide Federal agencies instructions on the water efficiency requirements in the Executive Order including defining industrial, landscaping, and agricultural water use, exemptions, and water reuse strategies. Also, the EPA has issue guidance on the stormwater requirements available on the [EPA website](#).

## Establishing Baseline Measures for Current Water Use

*Reference Slides 16 - 17 - Sources for Collection Background Information on Water Usage*

As referenced in slide 17 and 18 of the First Thursday Seminar, when getting started on your water management plan, there is basic information that needs to be identified including all sources of potable and non-potable water use. As part of this exercise, identify all sources the following:

Utility Information (if water/wastewater service is purchased)

- Water/wastewater rates
- Past bills for at least one year, but preferably two years
- Details on available utility programs, incentives, audit assistance, and other opportunities

Water Generation Information (if produce own water)

- Gallons produced
- Gallons treated (waste water)
- Associated costs of production/treatment

*Reference Slides 19 - Measure Metered and Unmetered Uses*

As referenced in slide 19 of the seminar, after collecting information on your supply water and metered uses, you now should estimate how much water is being used in unmetered uses. There are different approaches to estimate the water use of unmetered sources. Actual flow rate data and operating schedules can be gathered to calculate water use. (Some specific methods for estimating flow rates are described later on in this module.)

To estimate water consumption with this method you need to collect three basic things:

1. Flow rate of the activity/process (gallons per minute for example)
2. The length of time for the activity
3. Total number of uses over a given time period

This information will allow you to estimate the total monthly water use of the activity. Here is an example of how to estimate shower water use for an Army barrack:

1. The showerheads are rated at approximately 2.0 gallons per minute
2. Showers last approximately 5 minutes per person
3. There are 200 soldiers that live on-site and take one shower per day each month. Therefore there are about 6000 showers taken monthly.

The total monthly shower water use calculation:

$$2 \frac{\text{gallons}}{\text{minute}} \times 5 \frac{\text{minute}}{\text{shower}} \times 6,000 \frac{\text{showers}}{\text{month}} = 60,000 \frac{\text{gallons}}{\text{month}}$$

## Common Rate Structures for Studying Your Utility Bills

*Reference Slide 30 - 32 - Understanding Your Water Bill*

There are three predominant utility rate structure categories

- Flat rate
- Declining-block rate
- Inclining-block rate

With different rate structures, it is important to understand how to calculate your marginal cost of water. As referenced on slide 32 of the seminar, here is an example on how to determine the marginal cost of water for an inclining rate.

A site has an inclining rate structure as follows:

Water Use	Water Cost
0 – 999 Kgal	\$2 per Kgal
1000 – 5000 Kgal	\$3 per Kgal
5000+ Kgal	\$4 per Kgal

A water efficiency project reduces water from 5000 K gallons to 3500 K gallons. Overall savings is 1.5 million gallons. The marginal cost of the first 0.5 million gallons is in the \$3 per K gallon “block” cost. The last 1 million gallon of water saved is in the \$4 per K gallon “block”. Therefore, when calculating the cost savings of the project, ensure to assign the appropriate cost to the corresponding “block” of the rate.

**End-Use Efficiency  
 Toilets**

*Reference Slide 38 - Toilet Performance – MaP Testing*

A reliable independent toilet performance testing protocol that is used by water utilities across North America is the Maximum Performance (MaP) Testing. MaP testing has been in place since 2003, and evaluates the flushing performance of numerous toilet models in the marketplace. MaP testing results can be used to help you identify high performing toilets. MaP publishes test results periodically on both standard toilets and HETs. Below is an example table from a recent published MaP report showing test results.

**Maximum Performance (MaP) of Toilet Fixtures**  
 Sorted by Manufacturer

Appendix B

Revisions to the 15th Edition (Oct 2009) listing are noted below with a red block on the right margin →

MaP Test Report No. (for internal use)	Make	Model Name		Model Number	MaP Flush Performance (grams of solid waste removed from the toilet in a SINGLE flush)	Meets Los Angeles specification (SPS) for water savings sustainability (adjustability maximum & pilot fill valve)	Certified to meet U.S. EPA WaterSense Specification	1-piece or 2-piece model	Flush Valve Flapper size (in.)	Round Front (R) or Elongated (E) bowl	ADA-Comfort Height: Right Height Bowl	1.6G (el) Gravity-flush (includes full flush on a dual-flush fixture)	Power OR Pressure-Assisted Full Flush at 1.6G (6-L)	High-Efficiency Toilets (HETs)	
		Model Name	Model Number											Dual-Flush	Single-Flush Max 1.28-G (4.8L) Pressure-Assist
14-134	American Standard	Infinity Cadet 3 EL (one-piece)		2907-010 (one-piece)	1,000	YES		1	3	E					
15-039	American Standard	Boulevard EL ADA (one-piece)		2894-010 (one-piece)	1,000	YES		1	3	E	*				
15-040	American Standard	Boulevard EL ADA (one-piece)		2894-120 (one-piece)	1,000	YES	W.S.	1	3	E	*				HET
7-517	American Standard	Cadet 3 COMPLETE RP (18" rough-in)		2284-310: "COMPLETE" package and includes bowl, tank, seat, & installation mat as one piece or SKU. Includes 3011 bowl, 4019 tank	1,000	YES		2	3	R	*				
7-521	American Standard	Cadet 3 EL (18" rough-in)		2283-010: 3034 bowl, 4019 tank	800	YES		2	3	E	*				F
16-1629N	American Standard	Cadet 3 EL (18" rough-in)		2283-010: 3034 bowl, 4021 tank (unlined tank)	1,000	YES		2	3	E	*				F
7-541	American Standard	Cadet 3 EL (18" rough-in)		2283-600: 3034 bowl, 4021-100 (lined tank)	800	YES		2	3	E	*				F
7-520	American Standard	Cadet 3 EL (14" rough-in)		2283-014: 3034 bowl, 4027 tank	1,000	YES		2	3	E	*				F
7-518	American Standard	Cadet 3 EL ADA (18" rough-in)		2286-010: 3038 bowl, 4019 tank	1,000	YES		2	3	E	*				F
7-523	American Standard	Cadet 3 EL ADA (18" rough-in)		2286-802: 3038 bowl, 4021 tank (unlined tank). NOTE: this combination is also sold as 3035-800, which is identified as the "COMPLETE" package and includes bowl, tank, seat, & installation mat as one	1,000	YES		2	3	E	*				F

MAP Testing Report from October 2009 can be found at: [http://allianceforwaterefficiency.org/uploadedFiles/Resource\\_Center/Library/products/MaP/MaP\\_16/Appendix-B-16th-Ed-2-26-2010.pdf](http://allianceforwaterefficiency.org/uploadedFiles/Resource_Center/Library/products/MaP/MaP_16/Appendix-B-16th-Ed-2-26-2010.pdf)

**Commercial Kitchen Equipment**

*Reference Slide 41 – Kitchen Equipment*

Where to get more information:

- Energy Star: [http://www.energystar.gov/index.cfm?c=products.pr\\_find\\_es\\_products](http://www.energystar.gov/index.cfm?c=products.pr_find_es_products)
- Alliance for Water Efficiency: [http://www.allianceforwaterefficiency.org/Commercial\\_Food\\_Service\\_Introduction.aspx](http://www.allianceforwaterefficiency.org/Commercial_Food_Service_Introduction.aspx)
- Food Service Technology Center: <http://www.fishnick.com>

## Landscape and Irrigation

### Reference Slide 42 – Landscape and Irrigation Resources

Where to get more information:

- Water Sense: [http://www.epa.gov/watersense/services/cert\\_programs.html](http://www.epa.gov/watersense/services/cert_programs.html)
- Irrigation Association: <http://www.irrigation.org>
- Alliance for Water Efficiency:  
[http://allianceforwaterefficiency.org/Landscape\\_and\\_Irrigation\\_Library\\_Content\\_Listing.aspx](http://allianceforwaterefficiency.org/Landscape_and_Irrigation_Library_Content_Listing.aspx)

## Cooling Towers

### Reference Slide 43 - Cooling Towers

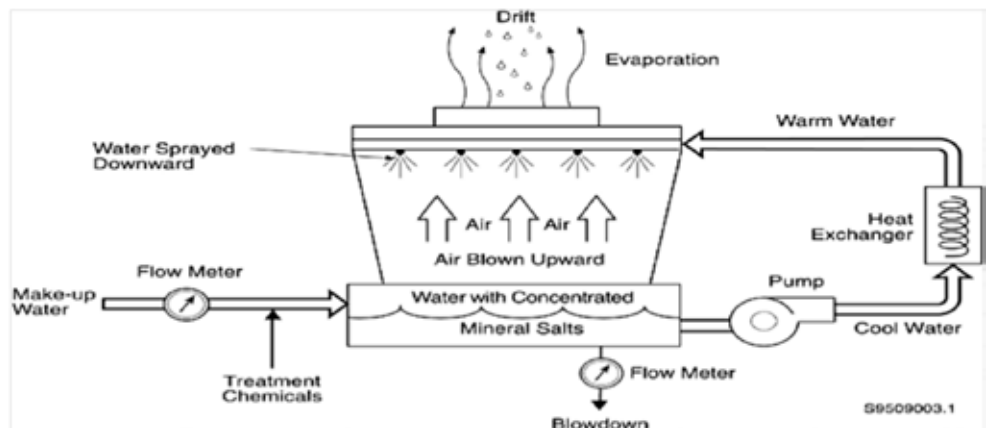
Cooling towers regulate temperature by dissipating heat from recirculating water used to cool chillers, air-conditioning equipment, or other process equipment. Cooling towers are very common in the Federal sector and can be found in nearly any type of facility. A common use of a cooling tower is a building's central cooling system. But cooling towers can also be used to cool a specific piece of equipment or process.

Heat is rejected from the tower primarily through evaporation; therefore by design, cooling towers consume significant amounts of water. As shown in the diagram below, cooling towers require makeup water to replace water lost through evaporation and also through “blow down”, which is water purged from the system after it reaches a certain level of solid buildup. The number of times water can be cycled through the system is termed “cycles of concentration”. There are innovative approaches to cooling tower water management that increase the cycles of concentration which can greatly reduce the need to purge water out of the system.

Some of these approaches include:

- Chemical treatment: institute a contract with a chemical vendor that requires a high number of cycles of concentration on the system. Note, that the number of cycles that can be achieved in the cooling towers will greatly depend on the water quality coming into the system.
- Chemical free platforms: there are non-chemical approaches available which include UV conditioners, pulsed power, and static electric field.
- Filtration: depending on the water quality coming into the system, a side-stream filtration system can limit fouling of the system and thereby increase the cycles of concentration.
- Advanced monitoring and automated controls: by closely monitoring “real-time” conditions of the cooling tower, blow down rates can be adjusted and matched exactly with the needs of the cooling tower which will help to increase the cycles and possibly reduce chemical costs as well.

### Cooling Tower Strategies Diagram



## Drought Management

*Reference Slides 55 - 57 - Drought Management Planning*

For reference during the seminar, the following definitions are provided.

Drought management entails a proactive approach to assessing the potential for drought to strike your area and then developing a plan to help reduce your demand for water through efficiency and conservation efforts. A good drought management plan works with a variety of stakeholders within your organization and beyond to local and state government.

Where to get more information on drought management:

US Drought Monitor:

<http://drought.unl.edu/DM/MONITOR.html>

NOAA Climate Prediction Center:

[http://www.cpc.ncep.noaa.gov/products/expert\\_assessment/seasonal\\_drought.html](http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html)

AWWA Drought Management Handbook:

<http://apps.awwa.org/eBusmain/OnlineStore.aspx> (search under "drought management")

EPA Drought Information:

<http://www.epa.gov/naturaldisasters/drought.html>

## Links to Water Efficiency Resources

Learn more about Water Efficiency by following these links.

**Alliance for Water Efficiency:** stakeholders-based national organization that serves as an authoritative advocate for water efficiency and sustainable use of water. The AWE promotes water efficiency through educational outreach and technical resources.

**American Water Works Association (AWWA):** international nonprofit scientific and educational society dedicated to the improvement of drinking water quality and supply. AWWA also runs the **Water Wiser** Web site, which provides comprehensive information on water efficiency to consumers and utilities.

**AWWA Bookstore:** books, videos, and training materials for the water and wastewater professionals.

**AWWA Water Loss Control:** distribution system audit software tool.

**Commercial, Institutional, and Industrial Water Users (CII):** technical information on a variety of topics in the CII sector including commercial food service, laundry service, and manufacturing.

**Compare Steamers:** ranking of eleven countertop steamers tested for efficiency and production capability.

**Energy Independence and Security Act (EISA) 2007:** recent legislation that contains Federal energy management goals and requirements while also amending portions of the National Energy Conservation Policy Act (NECPA).

**Energy Policy Act of 2005:** legislation that established a number of energy management goals for Federal facilities and fleets. It also amended portions of the National Energy Conservation Policy Act (NECPA).

**Energy Star Clothes Washer:** commercial clothes washers that have earned the Energy Star are up to 50% more energy-efficient and up to 50% more water-efficient than standard models.

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**Energy Star Dishwasher:** commercial dishwashers that have earned the Energy Star are on average 25% more energy-efficient and 25% more water-efficient than standard models.

**Energy Star Ice Machine:** commercial ice machines that have earned the Energy Star are on average 15% more energy-efficient and 10% more water-efficient than standard models.

**Energy Star Steam Cookers:** commercial steam cookers that have earned the Energy Star are up to 50% more energy-efficient and 90% more water-efficient than standard models.

**Energy Star:** a joint program of the US Environmental Protection Agency and the US Department of Energy helping people save money and protect the environment through energy-efficient products and practices.

**Environmental Protection Agency (EPA) Office of Water:** program that works on cost effective approaches to prevent pollution and reduce risk for people and ecosystems.

**EPA Stormwater Management for Federal Facilities under Section 438 of the EISA:** guidance for fulfilling the stormwater requirements of E.O.13514.

**EPA WaterSense:** partnership labeling program sponsored by the EPA that helps consumers identify water-efficient products.

**Executive Order 13423:** Executive Order that sets numerous Federal energy and environmental management requirements in several areas including reducing water intensity.

**Executive Order 13514:** Executive Order that expands upon the energy reduction and environmental performance requirements of Executive Order 13423 with specific provisions related to Federal water reduction.

**Federal Energy Management Program (FEMP):** DOE program that facilitates the Federal Government's implementation of sound, cost-effective energy management and investment practices to enhance the nation's energy security and environmental stewardship.

**Federal Water Use Indices:** a guide for Federal agencies providing a rough estimate of water usage at different types of sites.

**FEMP Energy Savings Performance Contracts (ESPC):** program that assists Federal agencies to accomplish energy savings projects without up-front capital costs and without special Congressional appropriations.

**FEMP Federal Water Efficiency Best Management Practices:** developed in response to Executive Order 13123 and updated for Executive Order 13423.

**FEMP Financing Mechanisms:** home page to available alternative funding avenues for FEMP projects

**FEMP Guidance for Developing Baseline and Annual Water Use:** guidance for Federal agencies to develop a water use baseline to fulfill Executive Order 13423.

**FEMP Utility Energy Services Contracts (UESC):** program that facilitates utility financing to cover the capital costs of the project, which are repaid over the contract term from cost savings generated by the energy efficiency measures.

Page 9

For additional information please contact:  
EERE Information Center  
1-877-EERE-INF (1-877-337-3463)  
[www.eere.energy.gov/informationcenter](http://www.eere.energy.gov/informationcenter)



[www.femp.energy.gov/training](http://www.femp.energy.gov/training)

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**FEMP Water Efficiency Case Studies:** case studies providing information about the performance, economics, and/or success of Federal water efficiency projects.

**Food Service Technology Center (FSTC):** the FSTC is the industry leader in commercial kitchen energy efficiency and appliance performance testing.

**FSTC Dishwasher:** operating tips for dishwashing machines and link to performance reports.

**FSTC Spray Valve Calculator:** tool to calculate water and energy savings or compare to existing spray valves.

**FSTC Spray Valve:** links to spray valves that meet the Standard Test Method for Performance of Pre-Rinse Spray Valves.

**FSTC Steam Cookers:** link to technical reviews on steam kettles and link to tip sheet on improvements for steam kettles.

**GSA Energy Center of Expertise:** GSA program that provides assistance to Federal agencies in energy and water management including information on areawide contracts general terms and conditions.

**GSA Schedule for Water Conservation:** services and consulting related to the reduction of water usage, recycling of water for multiple purposes, retention of water, improvement of water quality and water flow. These services can include, but are not limited to, facility water audits, water balance, and water system analysis.

**How Stuff Works Tunnel Washer:** video of tunnel washer in operation.

**Irrigation Association:** non-profit North American organization whose mission is to improve the products and practices used to manage water resources. The organization's areas of interest encompass the application, conservation, drainage, improvement, and recovery of water for economic and environmental enhancement in agriculture, turf grass, landscape and forestry.

**Laboratories for the 21st Century:** a voluntary partnership program dedicated to improving the environmental performance of US laboratories.

**Labs21 tool kit:** resources to support the design, construction, and operation of high-performance laboratories.

**Maximum Performance Testing:** a testing project started in 2003 in order to identify how well popular toilet models perform using realistic test media.

**Natural Gas Consortium Solutions for Efficiency Boiler Burner:** program that was formed to accelerate the acceptance of low emissions, high efficiency burners and boilers in order to help industrial customers select cost effective systems and to help comply with regional emission guidelines, policies and regulations.

**NSF International:** known for the development of standards, product testing and certification services in the areas of public health, safety and protection of the environment.

**Resources Library:** searchable on-line library of water efficiency technical materials including codes and standards, landscape irrigation, and metering.

**TEAM Energy Efficiency and Water Conservation:** action plans that address the energy efficiency and water conservation goals of the TEAM Initiative and Executive Order 13423.

**Transformational Energy Action Management (TEAM) Initiative:** Initiative challenging the Department of Energy to dramatically transform the Department's energy, environmental, and transportation management.

**US Centennial of Flight Commission:** explanation of Bernoulli's Principle related to how water venture meters operate.

**US General Services Administration (GSA):** Federal agency that provides workplaces by constructing, managing, and preserving government buildings and by leasing and managing commercial real estate. GSA policies promote management best practices and efficient government operations.

**Water Use It Wisely Rebate Map:** interactive US map that provides links to water rebates and partnering groups across the country.

**Water Use It Wisely:** conservation education outreach program

**WaterSense Bathroom Sink Faucets & Accessories:** private faucets that consume no more than 1.5 gallon per minute.

**WaterSense Landscape Irrigation:** WaterSense irrigation partners can help reduce water consumption, save money, and maintain a healthy and beautiful landscape.

**WaterSense Rebate Finder:** list of WaterSense partners that offer rebate programs for WaterSense labeled products and rebates.

**WaterSense Showerheads:** future showerheads bearing the WaterSense label will use not more than 2.0 gallons per minute, and ensure a high level of performance and user satisfaction.

**WaterSense Toilets:** toilets that use no more than 1.28 gallon per flush.

**WaterSense Urinals:** urinals that use no more than 0.5 gallons per flush.

## Glossary of Water Management Terms

The glossary of terms below provides key definitions to terms related to Federal water management including topics involving regulations, legislation, and end-use efficiency.

**Agricultural Water Use** - water used for irrigation and other uses related to the production of agricultural products including food and goods through farming and forestry, water use related to animal and livestock operations, and agricultural research and development. Some examples of agricultural water use include (but are not limited to) crop irrigation, greenhouse operations, and dairy operations.

**Gross Square Footage of Building Space** - the facility gross square footage is the same value used to determine the energy use intensity related to Federal agencies' energy reduction goals.

**Industrial Water Use** - water used for the purposes of aiding in processes such as cooling, washing, and manufacturing. Industrial water often is supplied on-site, withdrawn from local freshwater sources, but industrial water can also be purchased from publically supplied sources. Some examples of industrial water consumptions may include (but not limited to) vehicle wash facilities, make-up water for cooling towers, and process steam production.

**Landscaping Water Use** - the controlled application of water to outdoor spaces that have been designed to achieve socio-behavioral, environmental, and/or aesthetic outcomes to supplement water requirements not satisfied by rainfall. Examples of landscaping water consumption include (but are not limited to) irrigation of turf or landscaped beds, recreational fields, and ornamental ponds and fountains.

**Non-consumptive Water Use** - water that is diverted from its water source and is returned to the point of diversion in the same quantity and quality as the original diversion. The term “same quantity” means that the volume of water diverted from the water source is the equivalent volume of water that is returned to the water source. The term “same quality” means that the water discharged is in compliance with effluent limitations contained in applicable discharge permits and that the designated use and the associated water quality criteria for the water source are maintained.

**Non-Potable Water** - water that is obtained from natural freshwater sources that is not of sufficient quality for human consumption and has not been properly treated or has not been permitted and approved for human consumption. Some examples of non-potable water include but are not limited to water pulled from aquifers or rivers used in process applications such as cooling towers and boilers, landscape irrigation, agricultural irrigation, and toilet flushing.

**Non-Sanitary Gray Water** - water generated by industrial processes or equipment such as reverse osmosis reject water and can contain chemicals, minerals, and solids.

**Potable Water** - water that is of sufficient quality for human consumption that is obtained from public water systems or from natural freshwater sources such as lakes, streams, and aquifers which are classified, permitted, and approved for human consumption.

**Sanitary Gray Water** - wastewater that is generated by restroom sinks, showers, and clothes washing machines and can contain pathogens. Wastewater generated by toilets, urinals, and kitchens are considered “black water” and are excluded from gray water.

**Water Consumption Intensity** - related to potable water use goal in EO 13514 and EO 13423, this term is defined as annual potable water use divided by total gross square footage of facility space reported in gallons per gross square foot.

**Water Factor** - total water consumption of one load of laundry divided by the capacity of the clothes washer – presented in gallons per cubic feet (gal/ft<sup>3</sup>).

**Water Reclaim** - discharge water wastewater effluent that is treated to a level that is appropriate to be used in another application. For example, wastewater can be treated and used in landscape irrigation.

**Water Recycle** - discharge water from an application or process is used again in the same application. For example, a vehicle wash facility can capture the final rinse water and use it in the first rinse cycle for the next vehicle.

**Water Reuse** - discharge water from one application or process that is captured, but not treated, and is utilized in another application. For example, reject water from a reverse osmosis system used for cooling tower make-up.

**Water Use Indices** - typical water use per person per day for different facility types.

## Handouts

You may also want to print a copy of the handouts for this seminar.

You can access the handouts at <http://www.femp.energy.gov/training>