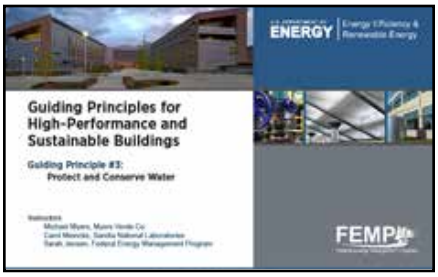
Guiding Principles for High-Performance and Sustainable Buildings eTraining Series

Course: FEMP 32
Duration: 1.0 hours
Learning Units: 1.0 LU
Prerequisites: None
HSW: Yes
IACET CEUs: 0.1

Guiding Principle III: Protect and Conserve Water



In the course, Guiding Principles for Existing High Performance and Sustainable Buildings, Guiding Principle III, Protect and Conserve Water, you will learn strategies for meeting the compliance requirements and recommended evidence of compliance for Guiding Principle III.

The Office of Management and Budget (OMB) uses the Guiding Principles to score federal agencies' progress and compliance within the Green Buildings category on annual agency scorecards.

This course focuses on the following fundamentals to meet and document compliance for high performance and sustainable buildings in a federal facility:

- Reduce Indoor Water Use
- Reduce Outdoor Water Use
- Measure Water Use
- Reduce Process Water Use, and
- Use Water Efficient Products.

Instructor

The instructor for this course is **Sarah Jensen**, Technical Lead for Sustainability, Federal Energy Management Program. Sarah also co-chairs the Interagency Sustainability Working Group (ISWG) with GSA. She most recently served as deputy director and environmental counsel for the Green the Capitol Office for the U.S. House of Representatives. She received a bachelor's degree in mass communications from James Madison University and a juris doctor degree in energy, environment, and natural resources law from Northwestern School of Law at Lewis and Clark College.

Learning Objectives

By successfully completing this course, you will be able to:

- Identify and implement sustainable operations and maintenance practices in the areas of water efficiency and conservation and environmental quality;
- Apply tools such as the EnergyStar Portfolio Manager to baseline and benchmark facilities, assess existing conditions, identify opportunities for improvement, and establish implementation plans and metrics to comply with the Guiding Principles;
- Recognize decision points and opportunities to implement sustainable strategies to achieve integrated, holistic and cost effective improvements; and
- Document meeting the Guiding Principle requirements through conformance with the recommended evidence of compliance.

In partnership with WBDG Whole Building Design Guide, a program of the National Institute of Building Sciences

FEMP Federal Energy Management Program

Guiding Principle III

3.1 Title Slide
Welcome to the FEMP e-Training series on Guiding Principles for Federal Leadership for Existing High Performance and Sustainable Buildings.

The course covers Guiding Principle III, Protect and Conserve Water.

3.2 Navigation Instructions
Each page of this course contains a navigation bar across the bottom.
The course will not move to the next page automatically, so you will need to use these buttons to move within the course. Click the play button or pause button to play or pause the course.
Click the back button to review the previous page.
Click the forward button to go to the next page.
Click and drag the progress indicator to move the course forward or backward.
Click the audio button to turn the audio on or off.
Click the exit button to close the course window.
Click the arrows in the top left corner of the screen to open or close the table of contents.
Click the "Notes From the Field" icon for more information.
Click the magnifying glass icon for "Recommended Evidence of Compliance" information.

3.3 Guiding Principles Overview
Federal agencies must comply with five Guiding Principles for High Performance and Sustainable Buildings.

1. Employ integrated assessment, operation, and management principles
2. Optimize energy performance
3. Protect and conserve water
4. Enhance indoor environmental quality
5. Reduce environmental impact of materials

Each Guiding Principle has its associated actions and requirements for compliance. In this course, we will cover Guiding Principle III: Protect and Conserve Water.

3.4 Guiding PrinciplesIII: Elements
Guiding Principle III includes actions, requirements, and Recommended Evidence of Compliance in the following areas:

- Reduce Indoor Water Use
- Reduce Outdoor Water Use
- Measure Water Use
- Reduce Process Water Use, and
- Use Water Efficient Products.

Welcome to this course. Now, let's get started.

3.5 Federal Potable Water Usage
The next few of images will provide some graphic representation of water use in the federal sector and how federal agencies use water. This first graph shows the amount of water consumed by various federal agencies.

3.6 Federal Potable Water Use Intensity
This graph shows water use intensity by square foot. The Department of Justice, NASA, the Department of Energy, the Department of Health and Human Services and the VA have the highest water use intensity. The Department of Justice uses large amounts of water in the Bureau of Prisons.

3.7 Typical Federal Office Building Potable Water Usage
This chart shows typical federal building water usage. Domestic water use -- water that goes through plumbing fixtures in buildings-- has the highest percentage at approximately 41%.
This is based on a building with 200 employees with consumption at approximately 3,000 gallons a day.
Click on the link for more information. *http://www.femp.energy.gov/program/waterefficiency.html*

3.8 Guiding Principle III: Reduce Indoor Water

The first action of Guiding Principle III is to reduce indoor water use. There are two options you can use to meet this action.

The difference between Guiding Principle III, water, and other Guiding Principles, such as energy, is that indoor water will allow you to use a site meter as opposed to a building meter. If you have a site meter installed, and you can show a reduction in your combined indoor and outdoor potable water use – by at least 20% based on 2003 or year thereafter – you can meet the guiding principle.

3.9 Reduce Potable Water Use: Option 1

Option 1 covers reducing potable water use by 20% compared to a water baseline calculated for the building. If your building and plumbing system was built in 1994 or later, the Guiding Principles call for a reduction of 20% of water usage from the baseline usage, calculated as 120% of the uniform plumbing codes. This means you need to meet code! For buildings and plumbing systems built before 1994, the Guiding Principles call for a 20% reduction from a baseline calculated as 160% of the water usage that would result from the 2006 code.

3.10 UPC and IPC Standards for Water Usage

This chart shows some of the UPC and IPC standards for water usage for various fixtures. If you are using Option 1, you must compare your building with these standards as your baseline, and determine whether you have met a 20% reduction. Click on the link for the Recommended Evidence of Compliance.

Recommended Evidence of Compliance:

- List of building fixtures and associated water performance
- Documented analyses

3.11 Reduce Potable Water Option 1: Water Audit Calculator

There are many ways for you to analyze and document the efficiency of your water fixtures and your site's water use. There are tools to automatically calculate the use in water fixtures, whether or not you meet code, and it also calculates your baseline.

The Guiding Principles do not give a prescribed format. Many companies that manufacture indoor water fixtures offer calculators like this. Choose a tool that is best for your site.

3.12 Reduce Potable Water Option 1: Sample Form

Many sites will choose Option 1 because they do not have water meters on their sites that measure water use at the building level. If your site uses water meters, then you may want to choose Option 2. Option 2 is a 20% reduction in water use compared to 2003 or years thereafter, using quality water data. Quality water data is not necessarily metered data, but metering is an easy way to collect quality water data. Click on the icons to see sample forms.

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Note that you can use water data from 2003 or a year thereafter. You can select your year as long as you can defend the selection.

3.13 Reduce Potable Water Use: Option #2

Option 2 is to reduce building-measured potable water use by 20% compared to building water use in 2003 or a year thereafter with quality water data. You'll notice in this Guiding Principle that there is no minimum water usage. This can be a problem at certain sites that made significant water improvements before 2003, and as a result, may find it difficult to achieve additional potable water reductions. The goal and or requirement for sites is to document a 20% savings from a base year to the current year. It is the goal that most sites will be able to meet this requirement by 2015.

This is a graph that shows different water usages. By documenting your water use in this way, or a similar way, you can demonstrate compliance. Click on the link for the Recommended Evidence of Compliance.

Recommended Evidence of Compliance: Provide metered data. Provide a Guiding Principles Checklist in Portfolio Manager (PM) *Change from Baseline: Indoor Water Use (%)* shows 20% reduction, or a *PM Water Performance Report* that documents 20% reduction.

3.14 Reduce Potable Water Use: Option 2 - A

You can use a water meter to document the indoor/outdoor water reduction by 20%. Some buildings, particularly leased spaces, do not have access to water meters, but they do get water bills. Those bills are considered quality water data and can be used to demonstrate the 20% reduction.

3.15 Action: Reduce Outdoor Water Use

The next action is to reduce outdoor water use. Under outdoor water, there are three options you can use to meet this Guiding Principle.

Option 1 is to reduce potable irrigation water use by 50% compared to conventional methods. Examine the standard operating procedures for irrigation in your area, and document the methods used. If you can reach a reduction of 50%, then you have met this requirement.

Option 2 is to reduce building related potable irrigation water use by 50%, compared to measured irrigation water use in 2003 or a year thereafter with quality water data. This option is similar to indoor water, if you have a meter, use that for a baseline.

Option 3 is to use no potable irrigation water. If your site is not using water for irrigation and can demonstrate that fact, you have met this requirement. Click on the icon for the Recommended Evidence of Compliance.

> **Recommended Evidence of Compliance:** Provide documentation comparing usage to conventional methods, analysis, or metered data, or document no irrigation.

3.16 Success Story: Water-Efficient Landscaping

For landscaping, choose plants that use little water, or plants that grow well in your particular region. This photo shows an example of a building landscape that uses no irrigation by using native plants. This building at Sandia National Laboratories is a good example of Option 3.

Click on the link to learn more about Sandia's program. *http://www.sandia.gov/aqua/landscape.htm*

3.17 Case Study: PNNL Grounds Maintenance Program

The PNNL Grounds Maintenance Program reused cooling pond water for grounds irrigation. This resulted in significant water savings. If you have to implement irrigation, can you find alternative means? Can you capture water? Can you reuse water?

Click on the link to learn more about PNNL's program.
https://www1.eere.energy.gov/femp/pdfs/water_pnnl.pdf

3.18 Measure Water Use - Water Meters

The next requirement for this Guiding Principle is the measurement of water use. There are two actions, and the first has two parts.

The first part is the installation of water meters for building sites with significant indoor and outdoor water use, and this is encouraged. The second part is that if only one meter is installed for the site, reduce the potable water use by at least 20% compared to building water use in 2003 or a year thereafter.

In the Portfolio Manager checklist, these two parts are combined. If you have one meter and have reduced water use by 20%, you have met both the indoor and outdoor water requirements. Click on the link for the Recommended Evidence of Compliance.

> **Recommended Evidence of Compliance:**
> Provide metered consumption data that demonstrates 20 percent reduction.

3.19 Measurement of Water Use - Stormwater

The second consideration in the measurement of water use states that you must employ strategies that reduce stormwater runoff and discharges of polluted water offsite. The Guiding Principles refer to the Energy Independence and Security Act, Section 438.

In terms of documentation, provide your stormwater runoff plan or stormwater strategies. In cases where you have a multi-building site or campus, you can provide the plan for the entire site. You can also provide documented inspections, permits, local regulatory approvals, or plans utilized per the Guidance.
http://www.epa.gov/greeningepa/stormwater/requirements.htm#guidance

3.20 Measurement of Water Use - EPA Guidance

The EPA has provided Guidance on meeting the requirements of Section 438 of EISA. The appropriate staff should read the guidance and determine how it applies to your building or site.

Download a copy of the EPA document titled "Technical Guidance on Implementing Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act."
http://www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf
Click on the icon for the Recommended Evidence of Compliance.

> **Recommended Evidence of Compliance:** Provide stormwater runoff plan and stormwater strategies, documented inspection, permits, local regulatory approvals or plans utilized per Guidance.

3.21 Action: Reduce Process Water

The next action deals with process water. Pursuant to EPAct 2005, Section 109, when potable water is used to improve a building's energy efficiency, deploy lifecycle cost effective water-conservation measures.

Here, you need to show that you have a water efficiency strategy to minimize water use for that particular energy savings activity. Click on the icon to the Recommended Evidence of Compliance.

> **Recommended Evidence of Compliance:** Prepare documentation stating if potable water is being used for energy efficiency and, if so, document measures implemented to conserve water; if not life-cycle cost effective, provide justification.

3.22 Success Story: Sandia National Laboratory Microelectronics Plant

This is a success story from Sandia National Laboratory showing the use of reusing cooling tower make up water and the significant savings that resulted from this project.

The Microelectonics Plant project uses high efficiency reverse osmosis technology for a 90% recovery rate. It has resulted in an annual water savings of more than 140 million gallons. Click on the link to learn more about the Sandia success story. ***http://www.sandia.gov/aqua/processes.htm***

3.23 Action: Use Water Efficient Products

The next action under Guiding Principle III deals with water-efficient products. This particular action has requirements in two parts. The first part is to use EPA's WaterSense label or other water saving products where available. WaterSense is similar to ENERGY STAR labeled products. For the first part, when the Guiding Principles were written in 2006, there were not many cost-effective water-efficient products on the market. Now there are. So, proving a product is not available will be more difficult today.

The second part covers irrigation contractors. They need to be certified under Watersense. The second part only applies if you have irrigation contractors at your site. If you have in-house staff that deals with irrigation, they do not necessarily need to be certified, but it is recommended. Click on the link to view a list of WaterSense Labeled Products. ***http://www.epa.gov/watersense/pp/lists.htm***

Click on the icon for the Recommended Evidence of Compliance.

> **Recommended Evidence of Compliance:** Specify WaterSense-labeled products and other water-conserving products in site- or building-level bid, procurement, purchasing, or contract specifications.

3.24 What is WaterSense?

What is WaterSense? WaterSense is a voluntary partnership and labeling program launched by EPA in 2006. Manufacturers are able to place the label on their products that certifies that these products are water conserving. The WaterSense program is a label with integrity and it addresses water efficiency and performance.

3.25 WaterSense Resources

The WaterSense program is well established, broad in scope, and inclusive of many stakeholders and organizations. Click on the link to learn more, or call the toll-free hotline. (866) WTR-SENS (987-7367)
http://www.epa.gov/watersense/

3.26 Best Management Practices

FEMP also developed several best practices to manage water use. Here is the website to access the information, and here are the topics that are discussed as the best practices in the guidance documents. Click on the link to learn more: *http://energy.gov/eere/femp/federal-water-efficiency-best-management-practices*

3.27 Guiding Principle III: Course Summary

This course covered Guiding Principle III, Protect and Conserve Water. We covered the following areas:

- Reduce Indoor Water Use,
- Reduce Outdoor Water Use,
- Measure Water Use,
- Reduce Process Water Use, and
- Use Water Efficient Products.

Thank you for your interest and commitment for Federal Leadership in Existing High Performance and Sustainable Buildings. We hope that you will also take the other e-Trainings in this series on the Guiding Principles.

Now, please take a moment to click on the link at the top of your screen to complete the quiz and short course evaluation. This will provide you with continuing education credits and provide FEMP with valuable feedback to continue to improve training offerings.

End of Guiding Principle III Course