

# RECLAMATION

*Managing Water in the West*

## Interpretation of the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings – Existing Buildings



U.S. Department of the Interior  
Bureau of Reclamation  
Policy and Administration  
Denver, Colorado

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## **Mission Statements**

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

# **Interpretation of the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings – Existing Buildings**

*Prepared by*

Policy and Administration



**U.S. Department of the Interior  
Bureau of Reclamation  
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Denver, Colorado**

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# Acronyms and Abbreviations

2008 Farm Bill	Food, Conservation, and Energy Act of 2008
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASTM International	American Society for Testing of Materials (formerly ASTM)
BMP	building management plan
CARB	California Air Resource Board
CBE	The Center for the Built Environment
CFR	Code of Federal Regulations
clo	insulating value of clothing
CPG	Comprehensive Procurement Guideline
DOE	U.S. Department of Energy
EA	Energy and Atmosphere
EB	Existing Buildings
EBOM	Existing Buildings Operations and Maintenance
EISA	Energy Independence and Security Act of 2007
EMP	Environmental Management Plan
EMS	Environmental Management System
ENV 05-01	Reclamation Manual Directive and Standard (D&S), <i>Environmental Management System (EMS) Implementation</i>
ENV P05	Reclamation Manual Policy, <i>The Bureau of Reclamation's Commitment to Environmental Stewardship</i>
EO	executive order
EO 13423	<i>Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management</i>
EO 13514	<i>Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance</i>
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
EPEAT™	Electronic Product Environmental Assessment Tool
EPP	environmentally preferable product

ESPC	energy savings performance contracts
ET	electronic transmittal
ETS	environmental tobacco smoke
FAR	Federal Acquisition Regulations
fc	footcandles
FEMP	Federal Energy Management Program
FMR	Federal Management Regulation
FSC	Forest Stewardship Council
FSRIA	Farm Security and Rural Investment Act
FY	fiscal year
gpm	gallons per minute
GSA	General Services Administration
gsf	gross square feet
Guiding Principles	<i>Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings</i>
GWP	global warming potentials
HVAC	heating, ventilating, and air-conditioning
IAOM	Integrated Assessment, Operations and Management
IAPMO	International Association of Plumbing and Mechanical Officials
IEQ	Indoor Environmental Quality
IES	The Illumination Engineering Society
IESNA	Illuminating Engineering Society of North America
IPC	International Plumbing Code
IPM	integrated pest management
LCCA	lifecycle cost analysis
LED	light-emitting diode
LEED®	Leadership in Energy and Environmental Design
MR	Materials and Resources
NC	New Construction
NIST	National Institute of Standards
O&M	operation and maintenance
ODP	ozone-depleting potentials
OMB	Office of Management and Budget
OMB Guidance	<i>High Performance and Sustainable Building Guidance</i> , Office of Management and Budget, December 2008

RAR	Reclamation Acquisitions Regulations
RCRA	Resource Conservation and Recovery Act
Reclamation	Bureau of Reclamation
RGPC-EB	<i>Reclamation Guiding Principles Checklist for Existing Buildings</i>
RM	Reclamation Manual
SBIP	Sustainable Building Implementation Plan
SBT	Sustainable Buildings Team
SCAQM	South Coast Air Quality Management District
SNAP	Significant New Alternatives Policy
SRI	solar reflectance index
SS	Sustainable Sites
TRMR	Temporary Reclamation Manual Release
U.S.C.	United States Code
UPC	Uniform Plumbing Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
VOC	volatile organic compounds
WBDG	Whole Building Design Guide
WE	Water Efficiency



# Interpretation of the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings – Existing Buildings

The purpose of this document is to provide guidance and the Bureau of Reclamation's (Reclamation) interpretation of the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (Guiding Principles), established in the Office of Management and Budget's *High Performance and Sustainable Building Guidance*, December 2008 (OMB Guidance). It also describes Reclamation-specific sustainable building requirements and provides further description of sustainable building concepts, issues, and strategies common to all buildings.

## Background

### What is a Sustainable Building?

Determining whether or not a building is sustainable is a complex task because sustainability addresses the building and its systems and operations in aggregate. A certain building may be highly energy efficient but not considered sustainable because it may waste water or have a poor materials recycling program. Another building may be made of "green" or renewable products but not considered sustainable due to poor energy efficiency. Buildings considered to be sustainable have significantly reduced environmental impacts in all aspects related to building design, construction, operation, maintenance, and use.

Comparing buildings and measuring them in terms of sustainability is difficult because there may not be agreement on the terms or the importance of individual sustainable attributes. Green building<sup>1</sup> rating systems, such as Leadership in Energy and Environmental Design (LEED<sup>®</sup>), Green Globes, and other rating systems were created to establish common, widely accepted sustainability performance levels and a framework to consistently assess a building's level of sustainability. Third-party sustainable building rating systems provide credits or points for attainment sustainable building attributes and offer an overall score. These numerical scores are used to benchmark buildings of similar type and size

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<sup>1</sup> Green building is the practice of creating structures and using processes that are environmentally responsible and resource efficient throughout a building's lifecycle from siting to design, construction, operation, maintenance, renovation, and deconstruction. Green building is also known as sustainable or high performance building. See: U.S. Environmental Protection Agency, *Definition of a Green Building*, <http://www.epa.gov/greenbuilding/pubs/about.htm>.

across the country, identify green or sustainable buildings, and certify their level of sustainability. Even with common rating systems, assessing and ranking buildings against the standards is often inexact and a contentious process.

## **The Guiding Principles**

The Federal Government has defined its own set of sustainable building requirements, which are known as the Guiding Principles. The Guiding Principles incorporate Federal sustainable building goals required by regulation and executive order (EO), as well as sustainable building concepts within green building rating systems.

Unlike private green building rating systems, which allow some choice regarding which credits may be met, all individual requirements within the Guiding Principles must be met. Another difference between Federal Guiding Principles and private sustainable building rating systems is that many of the Guiding Principles are written as concepts and principles to achieve, not prescriptive performance standards. With this greater level of flexibility also comes less clarification as to the minimum level of performance required to achieve compliance. This interpretive guidance is Reclamation's attempt to define a minimum level of compliance while still allowing flexibility in how a Guiding Principles requirement is achieved.

In accordance with the U.S. Department of the Interior requirements, Reclamation developed the *Reclamation Guiding Principles Checklist for Existing Buildings* (RGPC-EB) as a tool for communicating, assessing, and documenting compliance with each of the Guiding Principle requirements. There are approximately 50 individual Guiding Principle requirements within the RGPC-EB. The RGPC-EB states that each individual requirement provide a means for notating whether or not the requirement is met and the related comments, and acts as the record of sustainable building assessments. This document serves as supplemental guidance to the RGPC-EB on the Guiding Principle requirements.

## **Guiding Principle Requirements, Evidence, and Strategies for Compliance**

This section of the Guidance states each Guiding Principle, Reclamation's interpretation of the requirement, the minimum performance level, required evidence, background information, and strategies for compliance. Where applicable, related regulatory, EO, industry standards, and third-party rating system requirements are referenced. Appendix A contains a table summarizing the Guiding Principles and related requirements.

Internal and external parties conducting sustainable building assessments of Reclamation buildings should refer to the information presented below as supplemental guidance to Reclamation’s RGPC-EB to ensure consistent interpretation and analysis of Guiding Principle requirements. The information in this section may also be a useful reference source for building managers to understand the Guiding Principle requirements, the results of building assessments, the criteria against which their building was assessed, and, generally, strategies to achieve compliance. Individual sustainable building assessment reports may outline in greater detail the conditions, level of compliance, and the sustainable building practices recommended to achieve compliance with the Guiding Principles for a particular building.

## Assessing Compliance

Reclamation buildings should be assessed by qualified personnel using the RGPC-EB and this interpretative guidance. Each Guiding Principle requirement will be assessed for compliance and marked appropriately in the RGPC-EB. Building managers may update their level of compliance following an initial independent assessment. Requirements may be marked as follows in accordance with the level of compliance or applicability:

- **Not applicable.** In some cases, a building may not have a particular feature addressed by a Guiding Principle requirement (e.g., no running water, no landscaping). In these cases, the requirement is marked as not applicable.
- **Meets.** The Guiding Principle requirement is met in accordance with the interpretation and required evidence in this guidance document.
- **Does Not Meet.** A Guiding Principle requirement is marked as not met when there is no evidence that the required activity or performance level is achieved in accordance with this interpretive guidance.
- **Improvements Underway.** An assessor may evaluate a building as improvements underway for a Guiding Principle requirement when there is evidence that building management and staff have initiated some activities and are making progress towards compliance.
- **Exemption Sought/Sustainable Buildings Team (SBT) Exemption Concurrence.** There may be instances where a Guiding Principle requirement is applicable, but cannot be met due to significant budget limitations, technical feasibility, or other legal requirements (see Historical Assets below). In these cases, the original, independent assessor shall evaluate the requirement as Meets, Does Not Meet, or Improvements

Underway. A manager must then propose and seek concurrence from Reclamation's SBT on exemptions for requirement he/she believes cannot be met due to the limitations stated above.

## Historical Assets

Buildings identified as historic properties that undergo a sustainable building assessment require additional consideration so that their historic integrity is protected. For more information on requirements and recommendations for historic properties, see the National Historic Preservation Act of 1966, as amended (16 United States Code [U.S.C.] 470 et seq.); 36 Code of Federal Regulations (CFR) Part 800 - Protection of Historic Properties; The Secretary of the Interior's Standards for the Treatment of Historic Properties at <http://www.nps.gov/hps/tps/standguide/>; The Secretary of the Interior's Standards for the Rehabilitation and Guidelines for Rehabilitating Historic Buildings at [http://www.nps.gov/history/hps/tps/standguide/rehab/rehab\\_index.htm](http://www.nps.gov/history/hps/tps/standguide/rehab/rehab_index.htm); and The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings at <http://www.nps.gov/tps/standards/rehabilitation/sustainability-guidelines.pdf>.

For each Guiding Principle requirement, the historic building should be assessed for compliance with the Guiding Principles following the same process used for non-historic buildings in order to establish a baseline level of building sustainability compliance. However, the strategies for achieving sustainability compliance recommended in this guidebook may require adjustment if they affect the historic integrity of the building. If the agency proposes any action that could affect a historic property, the agency must comply with requirements of 36 CFR Part 800: (1) consult with the Advisory Council on Historic Preservation and/or the State Historic Preservation Office, the public, and any other involved entity; and (2) resolve any adverse effects through negotiated mitigation, or treatment. Reclamation compliance with 36 CFR Part 800 is conducted by Cultural Resources Management professionals.<sup>2</sup> If proposed changes affect the historic character and integrity of the building, then building managers should work with Cultural Resource Management professional and adjust the proposed changes, as necessary, to minimize the negative effects to the historic property.

The National Park Service, under its Technical Preservation Services program, develops historic preservation policy and guidance on preserving and rehabilitating historic buildings. A series of Preservation Briefs recommends methods and approaches for rehabilitating historic buildings that are consistent

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<sup>2</sup> See Reclamation Manual Directive and Standard, *Cultural Resources Management*, for more information on Reclamation internal requirements and roles and responsibilities related to cultural resources.

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with their historic character, which can be found at <http://www.nps.gov/tps/how-to-preserve/briefs.htm>. Where implementation of sustainable building strategies is not possible due to the need to preserve historic integrity, exemptions for compliance may be requested.



## Focus Area: Employ Integrated Assessment, Operation, and Management

### 1. Integrated Assessment, Operation, and Management Principles

Use an integrated team to develop and implement policy regarding sustainable operations and maintenance (O&M) that meets all of the following:

#### a. *Integrated Design – Environmental Management Systems*

**Guiding Principle Requirement:** *Incorporate sustainable operations and maintenance practices within the appropriate Environmental Management System(s) (EMS).*

**Requirement Description and Interpretation:** This Guiding Principle requires that building managers and occupants use the sound management practices of an EMS to reduce a building's environmental impact and achieve sustainability performance goals. An integrated building team or "green team" (measured under Section 1.f., Integrated Design – Green Teams) must follow a systematic EMS "Plan, Do, Check, Act" approach to establish building-specific goals to meet the Guiding Principles (measured under Section 1.c., Integrated Design – Performance Goals) and assign responsibilities for accomplishing tasks and milestones. Building-specific performance goals may be captured in action plans called Environmental Management Plans (EMPs). The team continues the EMS cycle by monitoring progress, reviewing results, and implementing actions to achieve continual improvement. The building does not need its own EMS procedures, but EMS procedures established by the region may be adopted. The building may be rated as having improvements underway if staff are functioning under the regional EMS and supporting regional goals but have not yet developed building-specific goals and EMPs to meet the Guiding Principles.

#### **Evidence of Compliance:**

- An organizational chart showing EMS responsibilities.
- Building management and staff awareness of the regional EMS and understanding of the EMS process, required procedures, and significant environmental aspects in relation to building operations and activities.

- Meeting minutes, EMPs, management reviews, and other records demonstrating implementation of a "Plan, Do, Check, Act" approach for measuring building performance.

**Background and Strategies for Compliance:** EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (EO 13423), as supplemented by EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (EO 13514), requires Federal agencies to implement EMS to address the environmental impacts of their activities and operations, and to implement Federal sustainability goals. EMS may be implemented at "appropriate organizational levels," as determined by agency management. An EMS provides a set of standardized procedures for achieving an organization's environmental stewardship policy. The basic framework involves a continuous "Plan, Do, Check, Act" management cycle. The cycle requires that the organization implement a number of steps to ensure sound environmental management, including: (1) identify environmental impacts, (2) establish environmental goals and objectives, (3) adopt operational procedures and controls to achieve the goals, (4) assign responsibilities, (5) identify needed training, (6) monitor progress, and (7) conduct management reviews. This management framework is followed by the building team to reduce environmental impacts of building operations, increase operational performance, and achieve the Guiding Principles.

Reclamation has established an environmental stewardship policy that directs senior managers and all employees to assess and ensure compliance with environmental laws and regulations, incorporate sustainable practices into activities and operations, and implement EMS to manage environmental impacts. Refer to Reclamation Manual (RM) Policy, *The Bureau of Reclamation's Commitment to Environmental Stewardship* (ENV P05). Reclamation also developed RM Directive and Standard, *Environmental Management System (EMS) Implementation* (ENV 05-01), requiring that each Regional Director develop EMS to address the environmental impacts of operations and activities within their control.

Each regional EMS manual is posted on Reclamation's Intranet site at <http://intra.usbr.gov/ems/Examples.html>. Also at this site are EMP templates that can be downloaded and customized by building management. To be in compliance, building management is **not** required to develop their own comprehensive set of EMS procedures. Instead, they must adopt and function within the regional EMS procedures.

**Related Requirements and Standards:**

- EO 13423, Sec. 3 (b)

- EO 13514, Sec. 2 (j)
- International Organization for Standardization, Standard 14001:2004
- ENV P05
- ENV 05-01

**Resources:**

U.S. Bureau of Reclamation, *Environmental Management Systems (EMS)*,  
<http://www.usbr.gov/ems/>

Federal Facilities and Environmental Stewardship & Compliance Assistance Center (FedCenter), *Environmental Management Systems (EMS)*,  
<http://www.fedcenter.gov/programs/EMS/>

**b. Integrated Design – Assessment**

**Guiding Principle Requirement:** *Assess existing conditions and operational procedures of the building and major building systems and identify areas for improvement.*

**Requirement Description and Interpretation:** This requirement ensures that managers understand their building’s current condition, establish a baseline level of performance against the Guiding Principles, measure progress in achieving the Guiding Principles, and identify building performance issues and strategies for improvement in sustainable operations. A third party may conduct the initial sustainable building assessment to ensure objectivity. To maintain compliance with this requirement, building staff must have procedures in place to periodically self-assess or undergo third-party evaluations of building performance against the Guiding Principles. A complete and thorough assessment of the Guiding Principles must occur before a building can declare full conformance. Once conformance is declared, a reassessment of conformance with the Guiding Principles must occur before the declaration expires in accordance with OMB Guidance, but no later than every 5 years.

A combination of assessments and inspections may be used to meet the requirement as long as all Guiding Principles are assessed in a relatively similar timeframe and the results of the various assessments are captured in the RGPC-EB. For example, energy evaluations and commissioning as required by the Energy Independence and Security Act of 2007 (EISA), in-house or third-party energy audits, EMS conformance audits, and acquisition internal control reviews all provide baseline data on Guiding

Principle compliance and may provide sufficient data for completing a significant portion of a sustainable building assessment.

**Evidence of Compliance:** A building assessment that includes all the following activities meets this requirement:

- Evaluates the building’s level of compliance with each of the Guiding Principles in the RGPC-EB in accordance with this guidance.
- Confirms or establishes current energy and water consumption levels and inspects relevant building components, systems, and subsystems for proper functionality (systems include, but are not limited to, heating, ventilation, and air-conditioning [HVAC]; electrical; water and sewer; plumbing; irrigation; and lighting).
- Identifies strategies for meeting the Guiding Principles.
- Occurs within the established frequency.

**Background and Strategies for Compliance:** A sustainable building assessment takes an in-depth and comprehensive look at building performance and strives to identify both simple and more robust improvements that can reduce a building’s environmental impact and improve efficiency. The Guiding Principles are used as the criteria from which to measure building performance. Assessments should be performed on a scheduled basis, preferably annually, but no later than every 3 years. The sustainable building assessment differs from commissioning<sup>3</sup> because it analyzes building data and O&M practices to determine status in achieving each of the Guiding Principles, but it does not necessarily test actual system function. The sustainable building assessment should ensure that commissioning was completed, if required, and use commissioning results as additional data on building condition and potential solutions to achieve greater performance.

**Related Requirements and Standards:**

- EISA, Section 432, Energy and Water Evaluations
- RM Temporary Reclamation Manual Release (TRMR), *Environmental Management System (EMS) Independent Conformance Audit and Declaration of Conformance Process*, TMRM-37

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<sup>3</sup> Commissioning is discussed in sections 2.a through 2.d.

**Resources:**

Whole Building Design Guide, *Facility Performance Evaluation*,  
[http://www.wbdg.org/design/engage\\_process.php](http://www.wbdg.org/design/engage_process.php)

**c. Integrated Design – Performance Goals**

**Guiding Principle Requirement:** *Establish operational performance goals for energy, water, material use and recycling, and indoor environmental quality, and ensure incorporation of these goals throughout the remaining lifecycle of the building.*

**Requirement Description and Interpretation:** The intent of this requirement is to establish building performance goals to achieve the Guiding Principles and operational efficiencies. The building green team develops performance goals for energy, water, material use and recycling, and indoor environmental quality, and records them in an EMP. Goals must be monitored, reviewed, and revised on a periodic basis.

**Evidence of Compliance:**

- Documented performance goals in an EMS manual, EMP, or the building management plan (BMP).
- Procedures for tracking, reporting, assessing, and revising building performance goals.

**Background and Strategies for Compliance:** Establishment of building-specific performance goals is the "Plan" step of the EMS "Plan, Do, Check, Act" process. Monitoring of goal accomplishment is the "Check" step. Performance goals are designed to meet the Guiding Principles and reduce environmental impacts of building operations. Progress in meeting the goals is measured from a baseline level of performance, often set during the initial sustainable building assessment. Examples of building performance goals may include, but are not limited to, the following:

- Reduce water use by an estimated 25 percent through irrigation sprinkler system upgrades from rotator heads to drip irrigation.
- Reduce energy consumption by an estimated 5 to 10 percent through implementation of lighting upgrades.
- Increase consumption of renewable energy use by approximately 15 percent through installation of a ground source heat pump.

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- Divert at least 50 percent of solid waste generated by building occupants from the landfill annually.
- Achieve sustainable purchasing for at least 95 percent of total applicable purchases audited annually.

**Related Requirements and Standards:**

- EO 13514, Section 2

**Resources:**

University of Colorado Denver, Anschutz Medical Campus, *Facilities Management – Sustainability Goals*,  
<http://www.ucdenver.edu/about/departments/FacilitiesManagement/FMGoals/Pages/SustainabilityGoals.aspx>

**d. Integrated Design – Building Management Plan**

**Guiding Principle Requirement:** *Incorporate a building management plan to ensure that operating decisions and tenant education are carried out with regard to integrated, sustainable building operations and maintenance.*

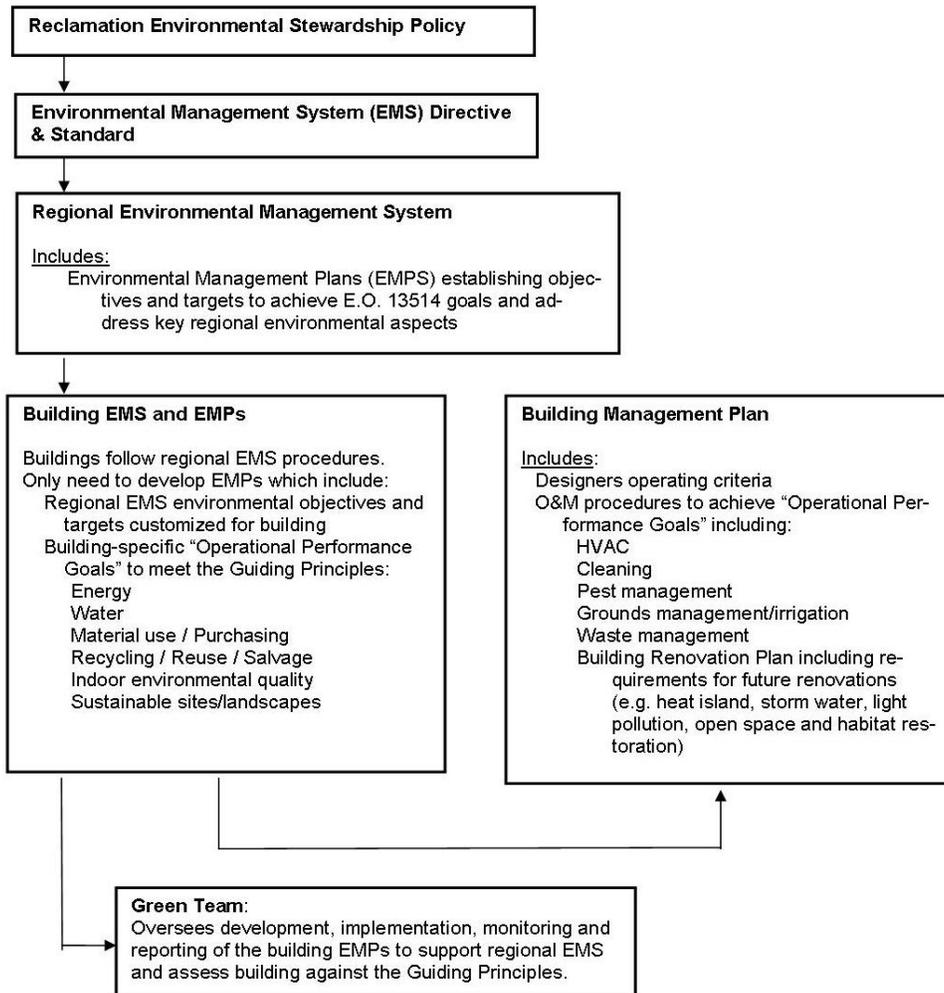
**Requirement Description and Interpretation:** Buildings targeted for compliance with the Guiding Principles must have a BMP in place in order to comply. The BMP must address how to operate and maintain major building systems and grounds (e.g., HVAC operating parameters, hours of operation, lighting and irrigation schedules, integrated pest management (IPM), hazardous and solid waste management, etc). BMPs must be designed to achieve optimal performance as identified in the building performance goals.

**Evidence of Compliance:**

- A hard copy or electronic BMP that includes written procedures for managing building systems and future building renovations in a manner that will achieve the Guiding Principles and other operational performance goals.
- Evidence that personnel understand and implement the BMP.

**Background and Strategies for Compliance:** The BMP is the "how-to" manual for operating and maintaining buildings in the most efficient manner possible. The BMP works hand in hand with the EMS. Whereas the EMS is

the strategic planning process by which an interdisciplinary team identifies the building’s environmental impacts and establishes performance goals to reduce those impacts and achieve the Guiding Principles, the BMP provides building management staff with detailed O&M instructions to ensure achievement of those goals. The EMS-BMP relationship is captured in figure 1.



**Figure 1.—Reclamation framework for meeting “Integrated Operations and Maintenance” Guiding Principle requirements – EMS and building management plans.**

The BMP should also include staff training requirements consistent with the Federal Building Personnel Training Act and strategies for educating building occupants about their role in achieving the building’s performance goals.

If maintained and updated, the BMP will promote continuity of information related to building system operations and analysis, energy-efficient O&M strategies, and a training resource for new building operators.

Appendix B contains a BMP framework with the operational elements that must be addressed. A sample BMP can also be found at [www.documents.dgs.ca.gov/green/BuildingOpPlanSAMPLE.doc](http://www.documents.dgs.ca.gov/green/BuildingOpPlanSAMPLE.doc).

**Related Requirements and Standards:**

- LEED for Existing Buildings: Operations and Maintenance (LEED EBOM) – Energy and Atmosphere (EA) Prerequisite 1: Energy Efficiency Management Practices – Planning, Documentation, and Opportunity Assessment (Building Operating Plan)
- LEED EBOM, Sustainable Sites Credit 3: Integrated Pest Management, Erosion Control, and Landscape Management Plan

**Resources:**

U.S. Department of Energy Federal Energy Management Program, *Operations and Maintenance Best Practices*, <http://www1.eere.energy.gov/femp/pdfs/OandM.pdf>

Whole Building Design Guide, *Sustainable O&M Practices*, <http://www.wbdg.org/resources/sustainableom.php>

**e. Integrated Design – Occupant Feedback**

**Guiding Principle Requirement:** *Augment building operations and maintenance as needed using occupant feedback on work space satisfaction.*

**Requirement Description and Interpretation:** The building manager must employ a formal process for obtaining and addressing occupant feedback on a regular schedule. Tenant surveys must pose questions about thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness, and any other comfort issues. There must also be a process for tracking service calls.

**Evidence of Compliance:**

- Formal procedures and a schedule for obtaining and addressing occupant feedback.

- Records of occupant feedback surveys.
- Service call logs and records of corrective actions.

**Background and Strategies for Compliance:** A sustainable building is one that not only performs efficiently, but is operated to provide a safe and productive work environment. As such, it is important to ensure that while implementing measures to increase energy efficiency of a building, thermal comfort conditions and lighting are maintained to enhance the occupants' comfort and well-being. An occupants' perspective on their comfort can help identify issues that could affect operations (e.g., wasted energy due to overlit or over-conditioned spaces), as well as employee health and productivity (e.g., excessive noise, space cleanliness, and indoor air quality).

Building managers should use regular occupant feedback and service calls to identify building performance and comfort issues. If survey results show that 20 percent or more of building occupants are dissatisfied with any criteria, the building manager should take corrective action. The Center for the Built Environment (CBE) offers an effective online occupant comfort survey tool that collects the required data and provides a completed report for approximately \$1,000 per facility (see resource list below).

**Related Requirements and Standards:**

- LEED EBOM, Indoor Environmental Quality (IEQ), Credit 2.1: Occupant Comfort – Occupant Survey
- American National Standards Institute (ANSI)/American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Standard 55-2004, *Thermal Comfort Conditions for Human Occupancy*

**Resources:**

The Center for the Built Environment, *Occupant Indoor Environmental Quality (IEQ) Survey™*, <http://www.cbe.berkeley.edu/research/survey.htm>

LEED for Existing Buildings: Operations and Maintenance, *Occupant Comfort Survey*, [http://www.greenexschools.com/Occupant-Comfort-Survey-Form\(v1\).pdf](http://www.greenexschools.com/Occupant-Comfort-Survey-Form(v1).pdf)

**f. Integrated Design – Green Team**

**Guiding Principle Requirement:** *Establish a green team to develop and implement policy regarding sustainable operations and maintenance.*

**Requirement Description and Interpretation:** An integrated team is necessary to facilitate sustainable operations at the building. Whether the team be called a green team, EMS team, or integrated team is irrelevant. For purposes of this guidance, integrated teams will be referred to as green teams. To achieve this requirement, there should be one lead person and an integrated cross-functional team, including representatives from facility management and other relevant programs, identified to facilitate the EMS and address building sustainability. The green team may or may not directly perform all of the activities under the Integrated Assessment, Operations and Management (IAOM) Guiding Principle; however, it should facilitate and coordinate these activities.

**Evidence of Compliance:**

- A team charter or roster.
- Documentation of meetings and records of regular attendance by green team members.
- Green team involvement in activities required by Guiding Principles IAOM, 1.a-d.
- Meetings occurring on a regular schedule, at least semiannually.
- Building management or occupant representation of the team if the green team is located offsite.

**Background and Strategies for Compliance:** Green teams facilitate building sustainability. They are meant to provide many different perspectives about O&M and business practices and should be cross-functional to include, as feasible, representation from facility management, operations, energy, sustainability, acquisitions, program staff, occupants, and appropriate leadership.

The green team is responsible for managing or facilitating the EMS process, overseeing sustainable building assessments, identifying building-specific performance goals and strategies, designating responsible parties to implement sustainable practices into building O&M, tracking results, reporting to upper-level management, and fostering continual improvement. The green team may also coordinate training, education, and outreach for building staff on the building's sustainability goals and practices.

**Resources:**

U.S. Department of Agriculture, *HQ's Green Team*, <http://greening.usda.gov/GreenTeams.htm>

U.S. Forest Service, *Green Teams*, <http://www.fs.fed.us/sustainableoperations/green-teams.shtml>

Georgia Department of Natural Resources, Sustainable Office Tool Kit, *Step Three: Forming the Green Team*, [http://www1.gadnr.org/sustain/toolkit/guidebook\\_3.html](http://www1.gadnr.org/sustain/toolkit/guidebook_3.html)

## 2. Commissioning

Employ commissioning, tailored to the size and complexity of the building and its system components, in order to optimize and verify performance of fundamental building systems.

### a. Commissioning – Agent

**Guiding Principle Requirement:** *Commissioning must be performed by an experienced commissioning provider.*

**Requirement Description and Interpretation:** This requirement applies to buildings above the EISA threshold or those below the threshold determined to need detailed commissioning through an energy and water evaluation or sustainable building assessment. If a building below the threshold undergoes an EISA energy and water evaluation or sustainable building assessment and further commissioning is not identified as a recommended conservation measure, then the requirement is considered to be met. If commissioning is recommended, the requirement is not met until commissioning is performed on building systems to the level of complexity recommended.

An "experienced commissioning agent" must have professional credentials such as professional engineer, certified energy manager, or equivalent experience, as well as documented commissioning authority experience in at least two building projects within the past 3 years. The individual serving as the commissioning agent must be independent of the project design and construction management, though the agent may be an employee of Reclamation. This requirement is not applicable if commissioning is determined unnecessary.

### Evidence of Compliance:

- Solicitations for commissioning services requiring experienced commissioning providers, resumes of commissioning staff in

contract proposals, or if performed in-house, proof of internal staff training and experience in commissioning.

- Analysis that commissioning is not required.

**Background and Strategies for Compliance:** ASHRAE Guideline 0-2005, *The Commissioning Process*, defines commissioning as "a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meets defined objectives and criteria."

The intent of commissioning is to use a systematic process to develop an understanding of the operation of the building's major energy-using systems, identify options for optimizing improved energy performance, and establish a plan to achieve energy savings. Commissioning uses site assessment, energy use breakdown, diagnostic monitoring, and functional testing to ensure building quality.

Building systems that do not operate properly may waste energy and have poor indoor environments. By ensuring that the building components are working correctly, commissioning helps reveal deficiencies, identify potential energy efficiency strategies, and improve environmental health, occupant safety, and indoor air quality. Recommissioning applies to existing buildings that were initially commissioned and will undergo commissioning again; retrocommissioning applies when the building has never been commissioned. Retrocommissioning helps to reduce operating costs, protect or enhance property value, and reduce the frequency of repair and replacement of equipment.

In accordance with EISA, Section 432, *Management of Energy and Water Efficiency in Federal Buildings*, buildings that are 50,000 gross square feet (gsf) or greater, or 25,000 gsf or greater with energy intensive operations (data centers, health facilities, utility plants, etc.), must employ an experienced commissioning provider to retro- or recommission the building. For buildings less than 50,000 gsf that do not have energy intensive operations and are meeting the energy requirements, it is generally not cost effective to retro- or recommission these buildings. Rather, the facility manager must work with O&M staff to conduct an in-house assessment, identifying operating problems and improvements (See Guiding Principle IAOM, 1.b. – Assessment Requirements). Commissioning may be recommended for all or part of a building below 50,000 gsf when an energy and water evaluation or sustainable building assessment indicates that building systems are not functioning efficiently or effectively.

**Related Requirements and Standards:** The following requirements, standards, and resources apply to commissioning requirements 2.a.-d.:

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- EISA, Section 432, *Management of Energy and Water Efficiency in Federal Buildings*
- LEED EA, Credit 2.1: Existing Building Commissioning – Investigation and Analysis
- ASHRAE Guideline 0-2005, *The Commissioning Process*

**Resources:**

Whole Building Design Guide, *Building Commissioning*,  
<http://www.wbdg.org/project/buildingcomm.php>

U.S. General Services Administration, *The Building Commissioning Guide*,  
<http://www.wbdg.org/ccb/GSAMAN/buildingcommissioningguide.pdf>

U.S. Department of Energy, *Facility Energy Management Guidelines and Criteria for Energy and Water Evaluations in Covered Facilities*, 25 November 2008,  
[http://www1.eere.energy.gov/femp/pdfs/eisa\\_s432\\_guidelines.pdf](http://www1.eere.energy.gov/femp/pdfs/eisa_s432_guidelines.pdf)

Portland Energy Conservation, Inc., Resources,  
<http://www.peci.org/resources/commissioning.html#rcxresources>

ASHRAE Guideline 0-2005, *The Commissioning Process*,  
<http://www.techstreet.com/ashraegate.html>

U.S. Green Building Council, *LEED Reference Guide for Green Building Operations and Maintenance* 2009, <http://www.usgbc.org>

**b. Commissioning – Report**

**Guiding Principle Requirement:** *When building commissioning has been performed, the commissioning report, summary of actions taken, and schedule for recommissioning must be documented.*

**Requirement Description and Interpretation:** If commissioning is required by EISA or determined necessary as a result of an energy and water evaluation or sustainable building assessment, then this requirement applies and is met once the commissioning report is complete. This requirement is not applicable if the building is under 50,000 gsf and commissioning is determined to unnecessary.

**Evidence of Compliance:**

- Commissioning report that contains results of the investigation and analysis as described below; or

- Analysis that commissioning is not required.

**Background and Strategies for Compliance:** A formal commissioning report will document the investigation and analysis phase of the commissioning process. It will identify all operating problems that affect occupants' comfort and energy use and detail every problem identified during the investigation and analysis phase, even if it was immediately adjusted, repaired, or rectified. The results of the investigation and analysis form the basis of potential operational changes, technological upgrades, and capital improvements that will provide energy savings for the building. The report must include a master list of findings and recommendations.

The commissioning report will also identify if building systems are working as intended and according to manufacturer specifications, considering factors such as occupancy. The commissioning report should describe verification procedures, documentation, and performance tests. The commissioning report must also include a recommended schedule for recommissioning, if applicable.

**c. Commissioning – EISA and FEMP**

**Guiding Principle Requirement:** *Meet the requirements of EISA 2007, Section 432, and associated Federal Energy Management Program (FEMP) guidance.*

**Requirement Description and Interpretation:** For purposes of Reclamation's interpretation, this Guiding Principle requirement can be met in two ways. A building can be considered to be in compliance with this Guiding Principle if: (1) it has undergone an energy and water evaluation in which additional commissioning has been determined unnecessary, or (2) commissioning is required by EISA or determined necessary, and the building has undergone commissioning in accordance with EISA, Section 432.

**Evidence of Compliance:**

- Documentation of a comprehensive energy and water evaluation which includes a determination of the need for detailed commissioning based on building operational performance.
- If commissioning is required, further evidence that commissioning providers, reports, and procedures meet EISA, Section 432, is necessary.

**Background and Strategies for Compliance:** EISA, Section 432, and associated FEMP guidance requires comprehensive energy and

water evaluations. Subsection (f), further states, "As part of the evaluation...the energy manager shall identify and assess recommissioning measures (if the facility has never been commissioned, retrocommissioning measures) for each such facility." EISA guidance clarifies the commissioning requirement: "If the initial walk-through [of an energy evaluation] finds that the building does not require more detailed commissioning efforts (i.e., all equipment is operating according to specifications and any identified minor remedial actions are addressed), then the commissioning requirement for the building is fulfilled [emphasis added]." As such, a building may meet this Guiding Principle requirement if it is below 50,000 gsf, undergoes an energy evaluation, and is determined to be operating effectively. If a building is greater than 50,000 gsf or is not operating effectively, commissioning must be conducted.

**d. Commissioning – Time Constraints**

**Guiding Principle Requirement:** *Building recommissioning must have been performed within four years prior to reporting a building as meeting the Guiding Principles.*

**Requirement Description and Interpretation:** If a building is required to be commissioned by EISA or has been determined to need commissioning for a specific system issue, retro- or recommissioning must have occurred within the last 4 years. If commissioning is not required by EISA or determined necessary, then the requirement is not applicable. Buildings required to be commissioned by EISA (e.g., greater than 50,000 gsf or with energy intensive operations) must do so every 4 years to continue to meet this requirement. Regular commissioning at buildings less than 50,000 gsf may not be cost effective. Instead, after initial retro- or recommissioning, the building manager must conduct periodic, in-house building reviews to identify operating problems and improvements. These reviews may be performed in conjunction with a sustainable building assessment for all Guiding Principles (See IAOM, 1.b. – Assessments).

**Evidence of Compliance:**

- Records of commissioning, including a commissioning report, completed within the last 4 years; or
- Analysis that commissioning is not required.

**Background and Strategies for Compliance:** Regularly scheduled recommissioning increases the life of the building and has potential cost savings. It allows building systems to continue to be fine-tuned to prevent problems and ensures that the effects of changes in occupancy, use, maintenance, and repair on building performance are assessed.

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Recommissioning analyzes building performance data generated by a building automation system or other metering equipment to verify building performance. This information can also be used to determine the environmental and financial results of capital investments implemented as a result of previous retrocommissioning.

Buildings that have a high level of complexity, including significant energy consumers and buildings with highly integrated controls and advanced systems, may realize the greatest benefit of ongoing recommissioning activities.

## Focus Area: Water Quality and Performance

### 1. Indoor Water – Water Use Reduction

#### Guiding Principle Requirement:

*OPTION 1: Reduce potable water use by 20 percent compared to a water baseline calculated for the building. The water baseline, for buildings with plumbing fixtures installed in 1994 or later, is 120 percent of the Uniform Plumbing Codes 2006 or the International Plumbing Codes 2006 fixture performance requirements. The water baseline for plumbing fixtures older than 1994 is 160 percent of the 2006 Uniform Plumbing Codes or the 2006 International Plumbing Codes fixture performance requirements.*

*OPTION 2: Reduce building measured potable water use by 20 percent compared to building water use in fiscal year (FY) 2003 or a year thereafter with quality water data.*

**Requirement Description and Interpretation:** To meet Option 1, the building's calculated water use, based on performance of current fixtures, must be at least 20 percent more efficient than a calculated baseline based on the applicable plumbing codes. Fixtures included in this requirement include water closets, urinals, showerheads, faucets, faucet replacement aerators, and metering faucets. LEED Water Efficiency (WE) Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency provides a method for calculating the installed water use versus the baseline, as required. To meet Option 2, there must be a measured 20-percent reduction in building water use between the most recent 12 months, and 12 months of water use from a baseline year. If there is only one meter installed on a multi-building site or there is only one meter for combined outdoor and indoor water use, the building can be in conformance with this requirement if there is a 20-percent reduction from a baseline for the entire site or combined building-level meter. Because EO 13514 requires Federal agencies to reduce water consumption from a FY 2007 baseline, 2007 is the recommended baseline year from which to compare water use.

#### Evidence of Compliance:

Evidence for Option 1 includes:

- List of building fixtures and associated water performance.
- Documented analyses comparing the calculated current water use to the calculated baseline demonstrates 20-percent reduction.

Evidence for Option 2 includes:

- Historic and present water bills, and meter readings.
- Calculations and benchmarking analysis between current and baseline water use.

**Background and Strategies for Compliance:** Reducing potable water use in buildings for urinals, toilets, showerheads, and faucets decreases the total amount withdrawn from rivers, streams, underground aquifers, and other water bodies. These strategies protect the natural water cycle and save water resources for future generations. In addition, less water use in buildings extends the life of water fixtures and systems. Water use reductions, in aggregate, allow municipalities to reduce costs and resources associated with capital investment needed for water supply and wastewater treatment infrastructure, chemicals for treatment, and energy use and the associated greenhouse gas emissions from treatment and distribution.

Strategies for reducing indoor potable water consumption may include using alternative water sources for nonpotable applications and installing building upgrades such as water-efficient fixtures, flow restrictors on existing fixtures, electronic controls, dry composting toilet systems, and waterless urinals. These efficiency measures can easily reduce water use in average commercial buildings by 30 percent or more. In addition, nonpotable water can be used for landscape irrigation, toilet and urinal flushing, custodial purposes, and building systems, where allowed by law.

EO 13514 requires that Federal agencies reduce potable water consumption intensity by 2 percent annually through FY 2020, or 26 percent by the end of FY 2020, from a 2007 baseline [§2(d)(i)]. This Guiding Principle supports the Federal water intensity reduction requirements.

**Related Requirements and Standards:**

- EO 13514, Section 2(d)(i)
- LEED EBOM, WE Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency
- LEED EBOM, WE Credit 2: Additional Indoor Plumbing Fixture and Fitting Efficiency
- International Association of Plumbing and Mechanical Officials (IAPMO), Publication IAPMO/ANSI UPC 1-2006, Uniform

Plumbing Codes (UPC), Section 402.0, *Water Conserving Fixtures and Fittings*, <http://www.iapmo.org>

- International Code Council, International Plumbing Codes 2006, Section 604, *Design of Building Water Distribution System*, <http://www.iccsafe.org>

**Resources:**

U.S. Department of Energy, Federal Energy Management Program, *Federal Water Efficiency Best Management Practices*, [http://www1.eere.energy.gov/femp/program/waterefficiency\\_bmp.html](http://www1.eere.energy.gov/femp/program/waterefficiency_bmp.html)

## 2. Outdoor Water – Water Use Reduction

### Guiding Principle Requirement:

*OPTION 1: Reduce potable irrigation water use by 50 percent compared to conventional methods.*

*OPTION 2: Reduce building related potable irrigation water use by 50 percent compared to measured irrigation water use in FY 2003 or a year thereafter with quality water data.*

*OPTION 3: Use no potable irrigation water.*

**Requirement Description and Interpretation:** The intent of this Guiding Principle is to reduce potable outdoor water use by 50 percent from conventional methods or baseline. To meet Option 1, the building must demonstrate through water modeling or analysis that its current irrigation system consumes 50 percent less than conventional irrigation methods. A site-specific conventional model typical for the region must be identified. Conventional irrigation systems typically use rotors that are only 60- to 70-percent efficient. Some widely available, high-efficiency irrigation technologies (e.g., drip irrigation, moisture sensors) can be 95-percent efficient. More details about completing this calculation are available in the LEED Reference Guide for Green Building Operations and Maintenance, 2009 edition.

Option 2 is only available if irrigation is separately metered or combined with indoor water use. If the meter is combined, a 20-percent reduction from a baseline satisfies this requirement. See Section 1, Indoor Water – Water Use Reduction. Because EO 13514 requires Federal agencies to reduce

potable water consumption from a FY 2007 baseline, 2007 may be used as the baseline year from which to compare outdoor potable water use.

For Option 3, if the source of water used for irrigation is other than potable water, then the requirement is met. If there is no irrigation, this requirement is also met.

**Evidence of Compliance:** Evidence for Option 1 is a detailed analysis or calculations comparing water consumption through use of conventional system and the current system. For Option 2, evidence is documented meter readings of potable irrigation or combined water consumption of the most recent 12 months compared with 12 months of the baseline year. For Option 3, evidence is analysis of water bills, visual inspection of nonpotable water use, or absence of any irrigation.

**Background and Strategies for Compliance:** Landscape irrigation practices in the United States consume large quantities of potable water. Outdoor uses, primarily landscaping, account for 30 percent of the 26 billion gallons of water consumed daily in the United States. Water-efficient landscaping helps conserve local and regional potable water resources. Maintaining natural aquifer conditions is important for providing reliable water sources for future generations.

Improved landscaping practices can dramatically reduce and even eliminate irrigation needs. Maintaining or reestablishing native plants on building sites fosters a self-sustaining landscape that requires minimal supplemental water and provides other environmental benefits. Native plants require less water for irrigation and attract native wildlife, thus creating a building site integrated with its natural surroundings. In addition, native plants tend to require less fertilizer and pesticides, avoiding water quality degradation and other negative environmental impacts.

A simple way to increase the efficiency of a conventional system is to schedule watering early or late in the day, when evaporation is minimal. Installing and monitoring dedicated meters for irrigation to manage water use helps landscaping staff detect leaks or other problems. Checking ground moisture levels and weather reports and adjusting irrigation schedules and amounts accordingly can also save water.

Another option to reduce outdoor water use and lower a building's operating costs is to install high-efficiency irrigation systems. Some widely available, high-efficiency irrigation technologies include micro or drip irrigation, moisture sensors, clock timers, and weather data-based controllers. A high-efficiency drip irrigation system can be 95-percent efficient, whereas sprinkler or spray irrigation systems are only 60- to 70-percent efficient. Many municipalities offer rebates or incentives for water-efficient irrigation

systems. Irrigation systems that use nonpotable water (rainwater, graywater, or reclaimed water) are as effective as systems that use potable water, but they save on water utility bills. Using graywater for irrigation also reduces the amount of wastewater delivered to water treatment facilities, which can provide cost savings while reducing demand on the municipal infrastructure and the environmental impacts associated with large-scale treatment facilities. Prior to pursuing these options, building managers should confirm their State and local water laws because some prohibit collection and harvesting of rainwater and graywater reuse.

**Related Requirements and Standards:**

- EO 13514, Section 2(d)(i)
- LEED EBOM, WE Credit 3: Water Efficient Landscaping

**Resources:**

LEED Reference Guide for Green Building Operations & Maintenance, 2009 edition.

U.S. Department of Energy, Federal Energy Management Program, *Guidelines for Estimating Unmetered Landscaping Water Use* (July 2010),  
[http://www1.eere.energy.gov/femp/pdfs/est\\_unmetered\\_landscape\\_wtr.pdf](http://www1.eere.energy.gov/femp/pdfs/est_unmetered_landscape_wtr.pdf)

U.S. Department of Energy, Federal Energy Management Program, *Federal Water Efficiency Best Management Practices*,  
[http://www1.eere.energy.gov/femp/program/waterefficiency\\_bmp.html](http://www1.eere.energy.gov/femp/program/waterefficiency_bmp.html)

U.S. Environmental Protection Agency, *Water-Efficient Landscaping*,  
[http://www.epa.gov/WaterSense/docs/water-efficient\\_landscaping\\_508.pdf](http://www.epa.gov/WaterSense/docs/water-efficient_landscaping_508.pdf)

Whole Building Design Guide, *Protect and Conserve Water*,  
[http://www.wbdg.org/design/conserves\\_water.php](http://www.wbdg.org/design/conserves_water.php)

### 3. Measurement and Verification

#### a. Stormwater Runoff

**Guiding Principle Requirement:** *Employ strategies that reduce stormwater runoff and discharges of polluted water offsite. Per EISA Section 438, where redevelopment affects site hydrology, use site planning, design, construction, and maintenance strategies to maintain hydrological conditions during development or restore hydrological conditions during development, to the maximum extent that is technically feasible.*

**Requirement Description and Interpretation:** The intent of this Guiding Principle is to retain more stormwater on-site and reduce discharges of polluted water offsite (refer to the U.S. Environmental Protection Agency [EPA] stormwater management program). To meet this requirement, the building must have one or more features currently in place to reduce stormwater runoff such as reducing impervious surfaces and incorporating porous pavement, bio-swales, on-site filtration, rain garden, green roofs, rain recycling, etc. If the building site is undergoing redevelopment that disturbs more than 5,000 square feet or more of ground area, EISA, Section 438 requirements for maintaining or restoring hydrological conditions apply. Requirements to reduce stormwater during future redevelopment should be included in project specifications.

**Evidence of Compliance:**

- Visual inspection to confirm the presence of at least one stormwater runoff reduction feature.
- Where applicable redevelopment is underway, documented evidence that EISA, Section 438 guidance is met.

**Background and Strategies for Compliance:** As areas are developed and urbanized, reduced surface permeability increases stormwater runoff, which is then transported by urban pipes and sewers to receiving waters (streams, rivers, lakes, bays, and oceans). Stormwater runoff harms water quality, aquatic life, and recreation opportunities in receiving waters. Stormwater gathered from hard surfaces such as parking areas and sidewalks can be contaminated with oil fuel lubricants, combustion byproducts, materials from tire wear, and deicing salts, contributing to water pollution. Higher runoff rates can cause erosion downstream and alter aquatic habitat. Effective strategies exist to control, reduce, and treat stormwater runoff before it leaves the building site.

Stormwater runoff is minimized by limiting the amount of impervious area. Strategies to minimize or mitigate impervious surfaces may include using pervious paving materials, harvesting stormwater for reuse, designing infiltration swales and retention ponds, planting vegetated filter strips, and installing vegetated roofs.

**Related Requirements and Standards:**

- EO 13514, Section 2(d)(iv)
- EISA, Section 438, Storm Water Runoff Requirements for Federal Development Projects

- LEED for New Construction (NC), Sustainable Sites (SS)  
Credit 6.1: Quantity Control and 6.2: Quality Control

**Resources:**

U.S. Environmental Protection Agency, *Low Impact Development*,  
<http://www.epa.gov/owow/NPS/lid/>

U.S. Environmental Protection Agency, *Green Infrastructure*,  
[http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298)

U.S. Environmental Protection Agency, *Federal Stormwater Management Requirements*,  
<http://www.epa.gov/oaintrnt/stormwater/requirements.htm>

U.S. Environmental Protection Agency, *Stormwater Pollution Prevention Plans for Construction Activities*, <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm>

**b. Water Meters**

**Guiding Principle Requirement:** *The installation of water meters for building sites with significant indoor and outdoor water use is encouraged. If only one meter is installed, reduce potable water use (indoor and outdoor combined) by at least 20 percent compared to building water use in FY 2003.*

**Requirement Description and Interpretation:** The intent is to better manage water use by installing meters where buildings consume large amounts of water. However, this is encouraged, not required. The 20-percent water consumption reduction requirement is covered in the Guiding Principle on Indoor Water - Water Use Reduction, and does not need to be measured again here.

**Evidence of Compliance:**

- Visual inspection and data analysis to verify the presence of a functioning water meter.
- The requirement is not applicable if there is no water meter.

**Background and Strategies for Compliance:** The first step to improving water efficiency is to understand current performance. By installing water meters, building managers can accurately measure water consumption, understand consumption patterns over time, and remedy possible deficiencies in water systems. By tracking water use alongside energy use, organizations can better understand how these resources relate to each other, make integrated management decisions that increase overall efficiency, and verify savings from improvement projects in both energy and water systems.

Organizations that manage water and energy performance together can take advantage of this relationship to create greener, more sustainable buildings.

Purchasing and installing water meters are upfront costs, and personnel costs for data logging, tracking, and meter maintenance are continuing expenses. However, the potential for water conservation and reduced operating costs provides an incentive for using meters. Metering can help detect water leaks or other deficiencies and identify reasons for fluctuating water use. A separate meter for outdoor water use has additional benefits. Water use for irrigation can make up a significant portion of total water consumption of a building. Separately metering water consumption for irrigation can help building managers understand outdoor water use patterns, detect and fix leaks in a timely manner, and determine the effectiveness of outdoor water use conservation strategies.

**Related Requirements and Standards:**

- LEED EBOM, WE Credit 1: Water Performance Measurement

**Resources:**

U.S. Department of Energy, Federal Energy Management Program, *Water Meter Economics*, <http://www1.eere.energy.gov/femp/pdfs/watermetereconomics.pdf>

U.S. Department of Energy, Federal Energy Management Program First Thursday Seminars, *Advanced Metering Requirements and Best Practices*, [http://www1.eere.energy.gov/femp/pdfs/metering\\_fftpresentation.pdf](http://www1.eere.energy.gov/femp/pdfs/metering_fftpresentation.pdf)

#### 4. Process Water

**Guiding Principle Requirement:** *Per EPA Act 2005, Section 109, when potable water is used to improve a building's energy efficiency, deploy lifecycle cost-effective water conservation measures.*

**Requirement Description and Interpretation:** If potable water is used in an HVAC system to improve energy efficiency, then lifecycle cost-effective water conservation measures must be in place, or there must be a determination that such measures are not lifecycle cost-effective to meet the requirement. The requirement is not met if there is a determination that lifecycle cost-effective measures are possible, but no such measures are in place. If potable water is not used for energy efficiency, then the requirement is not applicable.

**Evidence of Compliance:**

- Visual inspection of current conservation features and analysis that current features adequately reduce water consumption; or
- Visual inspection that the HVAC system does not use potable water for energy efficiency.

**Background and Strategies for Compliance:** The National Energy Conservation Policy Act, as amended by EISA, states that if water is used to achieve energy efficiency, water conservation technologies shall be applied to the extent that the technologies are lifecycle cost-effective. This Guiding Principle requirement would apply in instances in which a Federal agency was relying on technologies such as cooling towers or condensing units as a means to achieve energy efficiency. Currently proposed regulation would require that, to the extent lifecycle cost-effective, the technologies are water efficient.

Buildings are designed with cooling towers and condensing units that use water to dissipate the heat because they are often more energy efficient than other types of cooling systems. Significant amounts of water are used in these systems. For any cooling tower system, tower water losses occur from three main areas:

- Evaporation – the major cause of water loss.
- Drift – water loss from the tower cell due to escaping droplets of water in the air stream.
- Bleed-off – water intentionally removed from the system to allow entry of fresh, mineral-free water into the system to reduce mineral content. Total losses are approximately 0.0152 times the gallon per minute (gpm) flow rate. (Example: A 100-gpm flow has a 1.52-gpm water consumption rate.)

In order to balance energy conservation with water conservation, building managers must employ strategies to minimize water loss associated with cooling towers and condensing units. A closed-loop system is the most economical means of addressing water loss in these types of systems.

**Related Requirements and Standards:**

- Energy Policy Act (EPAAct) 2005, 42 U.S.C. 6834(a)(3)(A)(ii)
- LEED WE Credit 4.1-4.2: Cooling Tower Water Management

**Resources:**

ANSI/ASHRAE/USGBC/IES Standard 189.1-2009: *Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings*, Section 6.3.2.3, HVAC Systems and Equipment, and Section 6.4.2.1, Building Water Use Reduction Cooling Towers, <http://www.ashrae.org/publications/page/927>

U.S. Department of Energy, Federal Energy Management Program, *Best Management Practice: Single-Pass Cooling Equipment*, [http://www1.eere.energy.gov/femp/program/waterefficiency\\_bmp9.html](http://www1.eere.energy.gov/femp/program/waterefficiency_bmp9.html)

U.S. Department of Energy, Federal Energy Management Program, *Best Management Practice: Cooling Tower Management*, [http://www1.eere.energy.gov/femp/program/waterefficiency\\_bmp10.html](http://www1.eere.energy.gov/femp/program/waterefficiency_bmp10.html)

## 5. Water-Efficient Products

### a. **WaterSense<sup>®</sup> Products**

**Guiding Principle Requirement:** *Where available, use EPA's WaterSense-labeled products or other water conserving products.*

**Requirement Description and Interpretation:** For this requirement to be met, there must be evidence that: (1) WaterSense or equivalent fixtures are currently in use in the building; (2) water-consuming fixtures are being replaced with EPA's WaterSense or equivalent products; or (3) policies and procedures are in place to ensure future purchases meet the requirements. "Where available" is defined here as products where a WaterSense or equivalent product is available for purchase in the United States. To meet this requirement, at least 50 percent of all water fixtures installed and in use must be certified as EPA's WaterSense products or products with equivalent conservation specifications<sup>4</sup>. To rate this requirement as improvements underway, at least one fixture must be water efficient.

If a building does not meet the 50-percent threshold requirement, it can achieve compliance if there is evidence that purchases of water-using products since release of Electronic Transmittal (ET) No. 10-02, Revisions to Reclamation Acquisitions Regulations (RAR) Subpart WBR 1423, *Environment, Energy and Water Efficiency, Renewable Energy Technologies, Occupational Safety, and Drug-Free Workplace* (ET 10-02), effective December 31, 2009, were of WaterSense or equivalent products, or there must be justification that they were not purchased due to cost, performance, or availability issues. If there has been no opportunity to

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<sup>4</sup> A building may meet the 50-percent threshold for presence of WaterSense products but still be required to invest in additional water-efficient features to meet Water Quality and Performance, Water Use Reduction requirement 1.a.

solicit or purchase water-consuming products since release of the RAR, the building can claim that it meets the requirement if it has policies and procedures in place to purchase future products that meet the requirements. If the building does not meet the 50-percent threshold, did not replace fixtures with water conserving products, and does not have policies and procedures in place, then this requirement is not met.

**Evidence of Compliance:**

- Documented inventory of water fixtures and the associated specifications obtained through visual inspection and calculations demonstrating percent of fixtures in compliance; or
- Documented requisitions and purchase orders for WaterSense-labeled or other water conserving products; or
- Building-level policies (green purchasing plan, affirmative procurement plan) and procedures (acquisition checklists) to purchase water-efficient products.

**Background and Strategies for Compliance:** Managing water is a growing concern in the United States. Communities across the country are facing challenges regarding water supply and water infrastructure. By using water-efficient products and practices, consumers reduce water consumption and save money. In order to realize these savings, consumers need to be able to identify products and services that use less water while performing as well as or better than conventional models.

WaterSense, a partnership program sponsored by the EPA, helps consumers identify water-efficient products and programs. WaterSense-labeled product efficiencies exceed the Uniform Plumbing Code and the International Plumbing Code standards for some high-efficiency fixtures or fittings. WaterSense ensures consumer confidence in water-efficient products with a label backed by third party, independent testing, and certification. Certifying organizations help maintain the WaterSense integrity and credibility by verifying and testing products for conformance to WaterSense specifications, efficiency, performance, and label use, and also conducting periodic market surveillance. The WaterSense Web site lists products that meet these standards at <http://www.epa.gov/watersense>. In cases where WaterSense-labeled products are not available, building managers should research, identify, and install water fixtures with similar performance criteria.

High-efficiency plumbing fixtures or fittings can be easily incorporated into most existing buildings. However, it is typically only cost effective to replace current fixtures if their water efficiency is significantly below the

EPA WaterSense standards. If there is little opportunity to convert current water fixtures to more efficient ones, the BMP should include procedures to convert to high performance plumbing fixtures and fittings as part of future indoor plumbing renovations.

**Related Requirements and Standards:**

- *Instructions for Implementing EO 13423: Strengthening Federal Environmental, Energy, and Transportation Management* (Implementing Instructions), Section VI.A. (8)
- EO 13514, Section 2(d)(i) and 2(h)
- Federal Acquisition Regulations (FAR), Subpart 23.202(b) – Water-Efficient Products
- LEED WE Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency

**Resources:**

U.S. Environmental Protection Agency, *WaterSense*<sup>®</sup>, <http://www.epa.gov/watersense/>

U.S. Environmental Protection Agency, *National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances*, <http://www.epa.gov/watersense/docs/matrix508.pdf>

**b. WaterSense Irrigation Contractors**

**Guiding Principle Requirement:** *Choose irrigation contractors who are certified through a WaterSense-labeled program.*

**Requirement Description and Interpretation:** If the building hires a contractor to design, install, and maintain an irrigation system, the contractor must be a WaterSense-certified contractor. If WaterSense contractors are not available or willing to do the project, or if the building does not use outside contractors for its irrigation system, this requirement is not applicable.

**Evidence of Compliance:**

- Documented requisitions with specifications for WaterSense-certified contractors.
- Documentation of market research proving that no WaterSense contractors were available or willing to do the project.

**Background and Strategies for Compliance:** As stated above, water use for landscaping accounts for significant amounts of daily potable water use. WaterSense irrigation partners can help building managers reduce water consumption, save money, and maintain a healthy and beautiful landscape. These professionals are certified through WaterSense-labeled programs for their expertise in water-efficient irrigation technology and techniques. WaterSense-labeled irrigation programs verify an individual’s professional proficiency in water-efficient irrigation system design, installation, maintenance, and auditing.

**Related Requirements and Standards:**

- EO 13423, Section VI.A. (8), Implementing Instructions

**Resources:**

U.S. Environmental Protection Agency, *WaterSense - Outdoor*,  
<http://www.epa.gov/watersense/outdoor/index.html>



## Focus Area: Energy Performance

### 1. Energy Efficiency

#### a. Energy Efficiency Performance

##### Guiding Principle Requirement:

*OPTION 1: Receive an ENERGY STAR® rating of 75 or higher or an equivalent Labs21 Benchmarking Tool score for laboratory buildings.*

*OPTION 2: Reduce measured building energy use by 20 percent compared to building energy use in a FY 2003 baseline or a year thereafter with quality energy use data.*

*OPTION 3: Reduce energy use by 20 percent compared to the ASHRAE 90.1-2007 baseline building design if design information is available.*

**Requirement Description and Interpretation:** Option 1 is the preferred method for meeting this Guiding Principle. The intent of Option 1 is to use EPA's ENERGY STAR measurement and tracking tool, Portfolio Manager, to measure and demonstrate superior energy efficiency performance. A building is considered in compliance with this Guiding Principle requirement when it achieves an ENERGY STAR rating of 75 or higher using the most recent 12 months of energy utility data. Any building type eligible for a score on the ENERGY STAR energy performance scale can use Option 1 to demonstrate compliance. Building types that are ineligible to receive an ENERGY STAR score may use Option 2 to demonstrate compliance. Portfolio Manager or an internal database to track energy use may be used to record energy consumption from a FY 2003 or other baseline. Option 3 is used when Option 1 and Option 2 are not applicable and an energy use baseline and current consumption must be estimated (e.g., nonmetered buildings).

##### Evidence of Compliance:

Evidence for Option 1:

- ENERGY STAR Statement of Energy Performance shows a score of 75 or higher; and/or
- ENERGY STAR certification.

Evidence for Option 2:

- Portfolio Manager shows a "Change from Baseline: Adjusted Energy Use" reduction of 20 percent or more from a FY 2003 or other established baseline; and/or
- Documented energy accounting calculations showing total energy use derived from utility bills from the most recent 12 months compared to documented 12 months of energy consumption from a baseline year.

Evidence for Option 3:

- A model of building-estimated energy use, the inputs necessary to calculate energy requirements under ASHRAE, and the comparative results.

**Background and Strategies for Compliance:** ENERGY STAR is a government-industry partnership managed by the EPA and the U.S. Department of Energy (DOE). The ENERGY STAR Portfolio Manager rates a building's energy use against buildings of like age and size in similar climate zones nationwide based on a statistically representative model. The statistical models used to create the ratings are based on the national Commercial Building Energy Consumption Survey, which is conducted every 4 years by the Energy Information Administration of the DOE. Each rating on the 1 to 100 scale represents a percentile of the U.S. commercial building market's energy performance. Buildings that receive an ENERGY STAR rating of 75 are generally considered energy-efficient.

Energy efficiency reduces the environmental burdens associated with producing and using energy. Fossil fuels, such as coal and oil, are the most common source of energy used in buildings. However, these fuels are also a finite resource. The process of extracting and consuming energy from fossil fuels causes many negative environmental impacts, including air and water pollution, land degradation, solid waste generation, and rising greenhouse gas emissions. Mounting evidence connects fossil fuel-based energy use with climate change and serious risks to environmental and human health and safety. Data from the U.S. Energy Information Administration show that buildings are responsible for almost half (48 percent) of all energy consumed and greenhouse gases emitted annually.

By optimizing energy performance, building owners can reduce their environmental impacts, as well as reduce overall operating costs. Improving energy performance might involve implementing major equipment upgrades, adjusting or optimizing equipment, and/or enhancing operations for energy

efficiency. Avoiding energy use by turning off lights and HVAC systems when the building is unoccupied is an example of an enhanced operation that has low to no initial cost and rapid payback. Properly executed O&M programs that promote energy efficiency have been shown to save 10 percent to 20 percent on energy bills without significant capital investments. Additionally, preventive maintenance can reduce building operating costs by extending the life of equipment and reduce liability and risk associated with the health and safety of building occupants. Carefully designed energy-efficient upgrades in buildings can frequently pay for themselves because of the resulting energy and maintenance savings.

There are four fundamental strategies that can increase energy performance: reduce demand, increase efficiency, harvest free energy, and recover waste energy.

- Demand reduction includes reducing internal loads (e.g., energy needs) through improved building shell materials and insulation, modified lighting, appropriate operating schedules, energy-efficient equipment, and elimination of "phantom" loads consumed by electronic appliances while they are switched off or in a standby mode. Demand reduction involves no- or low-cost measures and should generally be considered first.
- Increasing efficiency can be accomplished through lighting upgrades, improved HVAC systems, and right-sizing HVAC systems. More efficient systems reduce energy demand and energy use.
- Harvesting site energy includes using free resources, such as daylight, ventilation cooling, solar heating, solar power, and wind energy to satisfy needs for space conditioning, service water heating, and power generation.
- Recovering waste energy can be accomplished through exhaust air energy recovery systems, graywater heat recovery systems, and cogeneration.

Building managers and projects staff should bundle short-payback actions (e.g., lighting upgrades) with long-payback options (e.g., chiller upgrades) to implement a suite of actions with acceptable cost-benefit and payback periods. The EPA estimates that every dollar invested in energy upgrades yields \$2 to \$3 in increased asset value of the building.

**Related Requirements and Standards:**

- EO 13423, Section 2(a)
- EO 13514, Section 2(a)(i)
- EISA, Section 431, Energy Management Requirements
- LEED EBOM, EA Credit 1: Optimize Energy Efficiency Performance
- ASHRAE 90.1-2007, *Energy Standard for Buildings Except Low-Rise Residential Buildings*

**Resources:**

*ENERGY STAR® Portfolio Manager Methodology for Accounting for Weather*,  
[http://www.energystar.gov/ia/business/evaluate\\_performance/Methodology\\_Weather\\_20110224.pdf](http://www.energystar.gov/ia/business/evaluate_performance/Methodology_Weather_20110224.pdf)

*ENERGY STAR® for Federal Agencies*,  
[http://www.energystar.gov/index.cfm?c=government.federal\\_agencies](http://www.energystar.gov/index.cfm?c=government.federal_agencies)

Whole Building Design Guide, Energy Efficiency Technical Guidance,  
[http://www.wbdg.org/references/mou\\_ee.php](http://www.wbdg.org/references/mou_ee.php)

ASHRAE Standard 90.1 2007, *Energy Standard for Buildings Except Low-Rise Residential*,  
<http://www.ashrae.org/technology/page/548>

U.S Department of Energy, Federal Energy Management Program, *Energy Savings Performance Contracts (ESPCs)*, [http://www1.eere.energy.gov/femp/pdfs/espc\\_intro.pdf](http://www1.eere.energy.gov/femp/pdfs/espc_intro.pdf)

Federal Energy Management Program, *Energy Savings Performance Contracts*,  
<http://www1.eere.energy.gov/femp/financing/espcs.html>

**b. ENERGY STAR and FEMP Products**

**Guiding Principle Requirement:** *Use ENERGY STAR and FEMP designated Energy Efficient Products, where available.*

**Requirement Description and Interpretation:** For this requirement to be met, there must be evidence that: (1) the building currently uses ENERGY STAR, FEMP-designated, or equivalent fixtures; (2) energy-consuming fixtures are being replaced with more energy-efficient options; or (3) policies and procedures are in place to ensure that future purchases meet the requirements. A sample of energy-consuming equipment, including building systems, lighting, and office products, will be evaluated. At least

50 percent of the energy-using equipment sampled must be ENERGY STAR, FEMP-designated, or products with equivalent conservation specifications. There must be at least one piece of equipment that is ENERGY STAR or FEMP-designated to rate as improvements underway.

If a building does not meet the 50-percent threshold requirement, it can achieve compliance if there is evidence that purchases of energy-using products since release of ET No. 10-02, effective December 31, 2009, were of ENERGY STAR, FEMP-designated, or equivalent products, or if they have claimed a procurement exemption in writing in accordance with the FAR, Subpart 23.204, *Procurement Exemptions*, due to cost or performance issues.<sup>5</sup> If there has been no opportunity to solicit or purchase ENERGY STAR or FEMP-designated products since release of the RAR, the building can claim that it meets the requirement if it can demonstrate that it has procedures in place to purchase future products that meet the requirements.

If the building does not meet the 50-percent threshold, did not replace equipment with energy-conserving products, and has no policies and procedures in place to ensure that future purchases meet the requirements, then the requirement is not met.

**Evidence of Compliance:**

- Documented inventory of sampled ENERGY STAR, FEMP, or equivalent products obtained through on-site visual inspection or photos and calculations demonstrating percent of products in compliance; or
- Requisition data (for example, specification sheets and contract language) and purchase orders confirming purchase of ENERGY STAR, FEMP, or equivalent products; or
- Agency or building-level purchasing policy (green purchasing plan, affirmative procurement plan) and procedures (acquisition checklists) which include requirements for preference of ENERGY STAR and FEMP-designated energy efficient products.
- Exemptions for ENERGY STAR or FEMP-designated products in accordance with the FAR, Subpart 23.204.

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<sup>5</sup> The exemption requirements for ENERGY STAR<sup>®</sup> or FEMP-designated products are more stringent than exemptions for other required materials because cost effectiveness and cost savings must be considered in addition to availability and performance. An agency is not required to procure an ENERGY STAR or FEMP-designated product if the head of the agency determines in writing that: (a) No ENERGY STAR or FEMP-designated product is reasonably available that meets the functional requirements of the agency; or (b) No ENERGY STAR or FEMP-designated product is cost effective over the life of the product, taking energy cost savings into account.

**Background and Strategies for Compliance:** ENERGY STAR-qualified and FEMP-designated products are energy efficient both because they use less energy to perform regular tasks and because, when not in use, they automatically enter a low-power mode. On average, these products use as much as 60 percent less electricity than standard equipment, thereby reducing utility and operating costs.

ENERGY STAR-qualified products include electronic office equipment such as desktop computers, copiers, fax machines, digital duplicators, notebook computers, mailing machines, external power adapters, monitors, printers, scanners, refrigerators, washer and dryers, and dishwashers, among many others. There are also ENERGY STAR HVAC systems and windows. ENERGY STAR-qualified products meet energy consumption specifications and use 30 percent to 75 percent less electricity than standard equipment. The ENERGY STAR Web site has detailed information and specifications available for download, plus resources to help locate ENERGY STAR products. If ENERGY STAR products are not available, office managers should seek to purchase equipment with similar energy specifications. Often, there can be products on the market that use even less energy than ENERGY STAR products, and these should be researched and considered as well (e.g., light-emitting diode (LED) backlit computer monitors).

FEMP does not purchase, recognize, endorse, or otherwise identify specific energy-efficient products for Federal procurement. Instead, FEMP identifies energy efficiency requirements for a category of products, which is typically an energy consumption level within the upper 25 percent of the product category.

The FAR requires Federal agencies to purchase ENERGY STAR and FEMP-designated products, unless exempted. Federal agencies may request exemptions from the ENERGY STAR or FEMP-designated requirements for availability and cost reasons in accordance with the FAR Subpart 23-204 – *Exemptions*.

**Related Requirements and Standards:**

- EPC Act 205, Section 104, and 10 CFR Part 436: Federal Procurement of Energy-Efficient Products
- EISA, Section 525, Federal Procurement of Energy Efficient Products
- FAR, Subpart 23.3 – Energy and Water Efficiency and Renewable Energy

- RAR, Section WBR 1423. 404 - Affirmative Procurement Programs, Section (a)(2)(i)(J)
- LEED EBOM, Materials and Resources (MR) Prerequisite 1: Sustainable Purchasing Policy

**Resources:**

ENERGY STAR® *Qualified Products*, <http://www.energystar.gov/products>

U.S. Department of Energy Federal Energy Management Program, *Energy-Efficient Product Procurement*,  
[http://www1.eere.energy.gov/femp/technologies/procuring\\_eeproducts.html](http://www1.eere.energy.gov/femp/technologies/procuring_eeproducts.html)

## 2. On-Site Renewable Energy – Implementation

**Guiding Principle Requirement:** *Per Executive Order 13423, implement renewable energy generation projects on agency property for agency use, when lifecycle cost-effective.*

**Requirement Description and Interpretation:** If it has been determined through lifecycle cost analysis (as described below) that renewable energy projects are cost effective, then the requirement is not met until a renewable energy project that reduces building energy usage is implemented. The definition of renewable energy is according to EPA Act 2005. Only renewable energy projects produced and used on Federal land associated with the building site may be counted towards this Guiding Principle. Renewable energy produced on-site and sold to the grid is not eligible. Although there is no minimum requirement, draft-revised Guiding Principles require that renewable energy, if lifecycle cost-effective, comprise at least 5 percent of total energy use. Buildings using Reclamation project hydropower produced on-site already meet this requirement. As there is no cost for energy, additional renewable energy projects would likely not be cost effective.<sup>6</sup> If renewable energy projects have been determined not cost effective, then this requirement is not applicable.

**Evidence of Compliance:**

- Documented on-site visual inspection and/or photos confirming renewable energy system(s); and/or

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<sup>6</sup> The presence of hydropower in no way prohibits building management from pursuing additional renewable energy projects for other purposes such as increased hydropower for the grid. However, it is not necessary to conduct further lifecycle cost analysis to meet this Guiding Principle requirement.

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- Documented analysis or meter readings showing the percentage of renewable energy in relation to total building energy use; and/or
- Guiding Principles Checklist in Portfolio Manager stating "Percent of Electricity from On-Site Renewable (%)"; or
- Justification that renewable energy is not cost effective through lifecycle cost analysis (LCCA); or
- Justification that renewable energy is not feasible based on building location.

**Background and Strategies for Compliance:** Energy production from traditional sources (such as coal, natural gas, and other fossil fuels) is a significant contributor to air pollution in the United States, releasing pollutants such as sulfur dioxide, nitrogen oxide, and carbon dioxide. These pollutants are primary contributors to acid rain, smog, and climate change and have widespread and adverse effects on human health, especially respiratory health.

Renewable energy systems include technologies designed to capture solar, wind, geothermal, water, or biobased energy to satisfy on-site electric power demand, or to directly offset space heating, space cooling, or water heating energy consumption. Research on the available technologies is essential; consider climate, geography, environmental impacts, and other regional factors that influence the appropriateness of an on-site renewable source for the building's energy use. Consider using technologies such as photovoltaic, solar thermal, geothermal, wind, biomass, and biogas energy.

Any amount of the following renewable energy technologies implemented and used on-site may be counted towards this Guiding Principle requirement:

- Photovoltaic systems
- Wind energy systems
- Solar thermal systems
- Biofuel-based systems (see list of eligible biofuels below)
- Geothermal energy systems
- Low-impact hydroelectric power systems and on-site Reclamation project power consumed directly by the building

- Wave and tidal power systems

The following biofuels are considered renewable energy under this credit:

- Untreated wood waste, including mill residues
- Agricultural crops or waste
- Animal waste and other organic waste
- Landfill gas

LCCA is a method for assessing the total cost of building ownership. It takes into account all costs of acquiring, owning, and disposing of a building or building system. LCCA is especially useful when project alternatives that fulfill the same performance requirements, but differ with respect to initial costs and operating costs, have to be compared to select the one that maximizes net savings.

**Related Requirements and Standards:**

Federal renewable energy requirements and related LEED requirements include:

- EPACT 2005, Section 205, Use of Photovoltaic Energy in Public Buildings
- EISA, Section 523, Standard Relating to Solar Hot Water Heaters
- EO 13423, Section 2(b)
- EO 13514, Section 2(a)(i)
- LEED EBOM, EA Credit 4: On-site and Off-site Renewable Energy

The LCCA shall be conducted according to the following standards:

- 10 CFR 436, Subpart A
- *National Institute of Standards (NIST) Handbook 135*
- *National Energy Conservation Act – Section 544(a)(1), 42 U.S.C. 8254(a)(1)*, which defines the lifecycle as the equipment life or 25 years

- EISA - Section 441, which defines the lifecycle as 40 years instead of 25 years, thus superseding the National Energy Conservation Act 25 year requirement

**Resources:**

U.S. Department of Energy, *Guidance on Life-Cycle Cost Analysis Required by Executive Order 13123*, April 2005, [http://www1.eere.energy.gov/femp/pdfs/lcc\\_guide\\_05.pdf](http://www1.eere.energy.gov/femp/pdfs/lcc_guide_05.pdf)

U.S. Department of Energy, Federal Energy Management Program, *Building Life-Cycle Cost (BLCC) Programs*, [http://www1.eere.energy.gov/femp/information/download\\_blcc.html](http://www1.eere.energy.gov/femp/information/download_blcc.html)

### 3. Measurement and Verification

#### a. Electricity Meters

**Guiding Principle Requirement:** *Per the Energy Policy Act of 2005 (EPAc 2005), Section 103, install building level electricity meters to track and continuously optimize performance.*

**Requirement Description and Interpretation:** The intent of this Guiding Principle requirement is to ensure that building level energy use is measured and tracked through electricity meters in accordance with EPAc and EISA requirements. EPAc, Section 103, requires that Federal buildings must be metered for energy use by 2012.

**Evidence of Compliance:**

- Presence of a functioning energy meter.

**Background and Strategies for Compliance:** Measurement of a building's ongoing energy consumption provides facility managers with critical information to better manage their energy performance and achieve operational cost savings. Sound record keeping and tracking of energy use through metering help identify areas for improvement in system-level and individual equipment performance. As energy efficiency improves, negative environmental impacts associated with energy use, including air pollution, water pollution, and natural resource depletion, will diminish. Metering also serves as an alert system for staff because energy system deficiencies and other problems can be easily discovered and remedied to improve operating efficiencies. With rising utility rates, maintaining an efficiently operating building will help keep costs down over time. Metering establishes an energy use baseline. This enables building owners to track and monitor energy use and the effectiveness of energy efficiency improvements over time.

EPAct 2005 requires agencies to install standard or advanced meters at all Federal buildings to the maximum extent practicable by October 1, 2012. For purposes of metering, EPAct defines buildings as those required to report annual energy use. However, the Guiding Principles do not make this distinction, and all buildings targeted to achieve compliance with the Guiding Principles must have electricity meters.

Advanced meters have the capability to measure and record interval data (at least hourly for electricity), and communicate the data to a remote location in a format that can be easily integrated into an advanced metering system. EPAct, Section 103, requires at least daily data collection capability. A standard meter is an electromechanical or solid state meter that cumulatively measures, records, and stores aggregated kilowatt data that is periodically retrieved for use in customer billing or energy management. The building size, complexity, energy consumption, and the return on investment should be considered when determining the type of energy meter to install.

**Related Requirements and Standards:**

- EPAct 2005, Section 103, Energy Use Measurement and Accountability
- LEED EBOM, EA Credit 3.2: Performance Measurement – System-Level Metering

**Resources:**

U.S Department of Energy, Federal Energy Management Program, *Guidance for Electric Metering in Federal Buildings*, February 3, 2006,  
[http://www1.eere.energy.gov/femp/pdfs/adv\\_metering.pdf](http://www1.eere.energy.gov/femp/pdfs/adv_metering.pdf)

**b. Natural Gas and Steam Meters**

**Guiding Principle Requirement:** *Per EISA 2007, include natural gas and steam meters, where natural gas and steam are used.*

**Requirement Description and Interpretation:** The intent of this requirement is to meet the metering requirements of EPAct 2005 and EISA.

**Evidence of Compliance:**

- Presence of functioning natural gas and steam meters.

**Background and Strategies for Compliance:** As stated above, metering systems allow building managers to reduce maintenance costs, prevent breakdowns, optimize energy performance, and develop maintenance procedures based on actual operating conditions. To obtain an accurate picture of building energy consumption, all sources of commercial energy, including natural gas and steam, must be metered.

**Related Requirements and Standards:**

- EISA 2007, Section 432, Management of Energy and Water Efficiency in Federal Buildings
- LEED EBOM, EA Credit 3.2: Performance Measurement – System-level Metering

**Resources:**

U.S Department of Energy, Federal Energy Management Program – First Thursday Seminars, *Advance Metering Requirements and Best Practices*, [http://www1.eere.energy.gov/femp/pdfs/metering\\_fftpresentation.pdf](http://www1.eere.energy.gov/femp/pdfs/metering_fftpresentation.pdf)

#### 4. Benchmarking

**Guiding Principle Requirement:** *Compare annual performance data with previous years' performance data, preferably by entering annual performance data into the ENERGY STAR Portfolio Manager. For building and space types not available in ENERGY STAR, use an equivalent benchmarking tool.*

**Requirement Description and Interpretation:** To meet this requirement, there must be evidence that management conducts ongoing benchmarking of the building's annual energy use using ENERGY STAR Portfolio Manager or another energy tracking and benchmarking system. At least 24 months of energy consumption data must be input into ENERGY STAR or benchmarking system to demonstrate annual benchmarking.

**Evidence of Compliance:**

- Current Portfolio Manager Benchmark Performance Report; and/or
- Portfolio Manager Baseline Comparison report for the two most recent comparative periods; and/or

- Current Portfolio Manager Statement of Energy Performance; and/or
- Labs21 benchmark report; and/or
- Other documentation showing comparison between the two most recent 12-month periods.

**Background and Strategies for Compliance:** Tracking energy use is a key step in implementing energy conservation strategies. ENERGY STAR Portfolio Manager is an interactive energy management tool that allows building managers to track and assess energy and water consumption for one building or an entire portfolio of buildings in a secure online environment. By tracking energy performance, building managers set investment priorities, identify underperforming buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance. Other systems that allow managers to input and track monthly energy use from all sources of energy are acceptable.

**Related Requirements and Standards:**

- EISA, Section 432, Management of Energy and Water Efficiency in Federal Buildings – Benchmarking of Federal Facilities
- LEED EBOM, EA Credit1: Optimize Energy Efficiency Performance

**Resources:**

*ENERGY STAR® for Federal Agencies,*  
[http://www.energystar.gov/index.cfm?c=government.federal\\_agencies](http://www.energystar.gov/index.cfm?c=government.federal_agencies)

Labs for the 21<sup>st</sup> Century, *Benchmarking,* <http://labs21benchmarking.lbl.gov/>



## Focus Area: Materials Selection

### 1. Recycled Content

#### a. EPA Designated

**Guiding Principle Requirement:** *Per section 6002 of RCRA for EPA-designated products, use products meeting or exceeding EPA's recycled content recommendations for building modifications, maintenance, and cleaning. If EPA-designated products meet performance requirements and are available at a reasonable cost, a preference for purchasing them shall be included in all solicitations relevant to construction, operation, maintenance of or use in the building.*

**Requirement Description and Interpretation:** The intent is to use EPA-designated products and other recycled content products in the operation and minor renovation of buildings. For building modifications, operations, maintenance, and cleaning,<sup>7</sup> buildings must purchase and use EPA-designated products that meet or exceed the minimum recycled content recommendations in the EPA's Comprehensive Procurement Guideline (CPG). This requirement only applies since release of ET No. 10-02, effective December 31, 2009. A sample of applicable EPA-designated building products that have been purchased will be evaluated. All of the products sampled must meet the recycled content requirements or have an approved waiver for exemption in accordance with RAR Subpart WBR 1423.404 (a)(1)(ii). If there has been no opportunity to solicit or purchase recycled-content products for building purposes since release of the RAR, the building can claim that it meets the requirement if it can demonstrate that it has policies and procedures in place to ensure that future purchases of EPA-designated products meet the requirements.

#### **Evidence of Compliance:**

- Requisition data (for example, specification sheets), Reclamation's *Recovered Materials Determination Form*, purchase orders, and contracts since December 31, 2009, confirming EPA-designated recycled content products; or
- Agency or building-level purchasing policy (green purchasing plan, affirmative procurement plan, green purchasing checklist) and

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<sup>7</sup> This requirement applies to products related to the modification, operation, maintenance, and cleaning of the physical structure of the building, not the day-to-day office activities of its occupants.

procedures (acquisition checklists) which include preference for EPA-designated recycled content products (from EPA's CPG); or

- If EPA-designated and other recycled content products sampled do not meet performance requirements, could not be obtained competitively within a reasonable time frame, or were not available at a reasonable cost, there must be evidence of Reclamation form WBR 1453.303-1423, *Determination to Waive the Requirements for Using Recovered Materials*.

**Background and Strategies for Compliance:** Materials selection plays a significant role in sustainable building operations. During the lifecycle of a material, extraction, processing, transportation, use, and disposal can have negative health and environmental consequences, including polluting water and air, destroying native habitats, and depleting natural resources. Environmentally responsible procurement policies can significantly reduce these impacts.

When products contain recycled content, they are beneficial to the environment because they reduce virgin material use and solid waste volumes. The purchase of products with recycled content expands markets for recycled materials, slows the consumption of raw materials, and reduces the waste entering landfills.

Many commonly used products are available with recycled content and perform as well as products containing only virgin materials, at little or no cost premium. Although some sustainable materials may carry a cost premium, an increase in awareness and demand for these products moves them into markets where they can compete with conventional materials.

EPA has established the CPG program as part of its continuing effort to promote the use of materials recovered from solid waste. The CPG program is authorized by Congress under section 6002 of the Resource Conservation and Recovery Act (RCRA). Through the CPG, the EPA designates products that are or can be made with recovered materials, and recommends practices for buying these products. Once a product is designated, Federal procuring agencies are required to purchase it with the highest recovered material content level practicable. Please refer to EPA's CPG site under Resources below for more information.

In accordance with FAR 23.405(a), Reclamation established a preference for purchase of EPA-designated items in RAR, Subpart WBR 1423.404 (a)(1)(ii): "100 percent of purchases of EPA- or USDA-designated items must contain recovered material or biobased content, respectively, unless an exemption applies as listed under FAR 23.404(b)."

**Related Requirements and Standards:**

- RCRA, Section 6002
- FAR Subpart 23.4 and RAR Subpart WBR 1423.4 – Use of Recovered Materials and Biobased Products
- EO 13514, Section 2(h)(i)
- LEED EBOM, MR Prerequisite 1: Sustainable Purchasing Policy

**Resources:**

U.S. Environmental Protection Agency, Comprehensive Procurement Guidelines, <http://epa.gov/cpg>

**b. Recycled Content**

**Guiding Principle Requirement:** *For other products, use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10 percent (based on cost or weight) of the total value of the materials in the project.*

**Requirement Description and Interpretation:** This requirement only applies to products for the purpose of minor building modification, renovation, or repair (e.g., replacing flooring, modifying office space, furniture upgrades). Only building modifications completed since release of ET No. 10-02, effective December 31, 2009, are considered. Compliance with this requirement is determined by calculating the total cost or weight of all project materials in comparison with the cost or weight of materials meeting the recycled content requirements.

**Evidence of Compliance:**

- Requisition data (for example, specification sheets), Reclamation's *Recovered Materials Determination Form*, purchase orders, contracts, and receipts since December 31, 2009, confirming the use EPA-designated and other recycled content products.
- Documentation of the amount and type (preconsumer/postconsumer) of recycled content of products used in the building project.

- Documented calculations demonstrating the percentage of recycled-content material out of the total material used for the project; or
- Evidence of Reclamation form WBR 1453.303-1423, *Determination to Waive the Requirements for Using Recovered Materials*, when recycled-content products are not incorporated in the percentage required.

**Background and Strategies for Compliance:** This Guiding Principle requirement references a related LEED requirement that at least 10 percent of all materials used for a building renovation project, based on the total cost of all materials, must be made of postconsumer recycled content plus one-half preconsumer content. The LEED Reference Guide for Green Building Operations and Maintenance, 2009, MR Credit 3 – Sustainable Purchasing – Facility Alterations and Additions, provides a sample for calculating the costs of all project materials and the percentage of materials meeting sustainability criteria.

The project concept only applies when there is a building modification. A project approach allows the building management flexibility in their selection of products as long as the recycled content requirement is met for the project as a whole. For non-EPA designated products purchased for building operation, maintenance, and cleaning activities, the building manager must ensure that individual building managers purchase products with the highest amount of recycled content available.

**Related Requirements and Standards:**

In addition to subsection 1.a., "EPA Designated," the following standard applies:

- LEED EBOM, MR Credit 3: Sustainable Purchasing – Facility Alterations and Additions.

**Resources:**

U.S. Environmental Protection Agency, Comprehensive Procurement Guidelines, <http://epa.gov/cpg>

LEED Reference Guide for Green Building Design and Construction, Materials and Resources, Credit 3 – Materials Reuse, page 366.

## 2. Biobased Content

### a. *USDA Designated*

**Guiding Principle Requirement:** *Per section 9002 of FSRIA, for USDA-designated products, use products with the highest content level per USDA's biobased content recommendations.*

**Requirement Description and Interpretation:** The building must meet or exceed biobased content recommendations for the USDA-designated products for building modifications, operations, maintenance, and cleaning.<sup>8</sup> This requirement only applies since release of ET No. 10-02, effective December 31, 2009. A sample of USDA-designated building products purchased since release of the RAR will be evaluated. Of the products sampled, 100 percent must meet the biobased content requirements or there must be an approved waiver for exemption in accordance with the RAR Subpart WBR 1423.404 (a)(1)(ii). If no opportunities existed for purchase of products that could be USDA designated (given the increasing prevalence of common biobased cleaning and other products, this is unlikely), then the building can claim it meets the requirement if it has policies and procedures to ensure that future purchases of biobased products meet the requirements.

#### **Evidence of Compliance:**

Evidence of use of USDA biobased products is:

- Requisition data (for example, specification sheets), purchase orders, and contracts since December 31, 2009, confirming USDA-designated products; or
- Agency or building-level purchasing policy (green purchasing plan, affirmative procurement plan) and procedures (acquisition checklists) which include preference for USDA-designated products; or
- Evidence of Reclamation form WBR 1453.303-1423-1, *Determination to Waive the Requirements of Using Recovered Materials*, when USDA biobased products are not purchased.

**Background and Strategies for Compliance:** The USDA BioPreferred<sup>®</sup> program aims to increase the purchase and use of renewable,

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<sup>8</sup> This requirement applies to products related to the modification, operation, maintenance, and cleaning of the physical structure of the building, not the day-to-day office activities of its occupants.

environmentally friendly biobased products while providing "green" jobs and new markets for farmers, manufacturers, and vendors. The BioPreferred program offers three major benefits: climate change impact reduction, energy/environmental security, and economic development.

BioPreferred was created by Farm Security and Rural Investment Act (FSRIA) and expanded by the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill) to increase the purchase and use of biobased products. The USDA manages the program. BioPreferred includes a preferred procurement program for Federal agencies and their contractors, and a voluntary labeling program for the broad scale consumer marketing of biobased products.

The BioPreferred program designates items or generic groupings of products, and specifies minimum biobased content levels. It also provides information on the technical, health, and environmental characteristics of these products. Once designated, Federal agencies and their contractors are required to purchase products with those biobased attributes. Under the voluntary labeling program, biobased products that meet the BioPreferred program requirements will soon carry a distinctive label for easier identification by government, businesses and consumers.

The USDA BioPreferred program has developed a catalog to provide Federal and contractor personnel with a searchable database of biobased products at <http://www.biopreferred.gov/>. Federal agency purchasing personnel and other staff can find and compare information on BioPreferred products and the companies that provide them.

**Related Requirements and Standards:**

- 2008 Farm Bill, Section 9002
- FSRIA 2002, Section 943
- FAR Subpart 23.4 and RAR Subpart WBR 1423.4 – Use of Recovered Materials and Biobased Products
- EO 13423, Section 2(d)
- EO 13514, Section 2(h)(i)

**Resources:**

U.S. Department of Agriculture, BioPreferred<sup>®</sup>, <http://www.biopreferred.gov/>

## **b. Rapidly Renewable**

**Guiding Principle Requirement:** *For other products, use biobased products made from rapidly renewable resources. If [these nondesignated] products meet performance requirements and are available at a reasonable cost, a preference for purchasing them should be included in all solicitations relevant to construction, operation, maintenance of or use in the building.*

**Requirement Description and Interpretation:** If the USDA BioPreferred program has not provided biobased content recommendations for a product (e.g., nondesignated product), the building manager must attempt to purchase nondesignated products for building construction, operation, maintenance, and cleaning with the highest content of rapidly renewable resources available. This requirement only applies since release of ET No. 10-02, effective December 31, 2009. A sample of nondesignated products that have been purchased and have the potential to be made from rapidly renewable resources will be evaluated. At least 50 percent of the sample must contain some level of rapidly renewable resources.<sup>9</sup> If there were no opportunities to purchase products made of rapidly renewable resources, then the building can claim it meets the requirement if it can demonstrate that it has policies and procedures in place to ensure that future purchases of nondesignated products will meet requirements for rapidly renewable content, as appropriate and in accordance with the RAR.

### **Evidence of Compliance:**

- Requisition data (for example, specification sheets), purchase orders, and contracts since December 31, 2009, confirming rapidly renewable products; or
- Agency or building-level purchasing policy (green purchasing plan, affirmative procurement plan) and procedures (acquisition checklists) which include preference for rapidly renewable products or the exclusion of virgin materials from specifications; or
- Justification when rapidly renewable products are not purchased.

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<sup>9</sup> The RAR does not contain specific requirements for rapidly renewable resources that are not USDA designated or covered under the RAR WBR 1453.404, 1(i)(b). As such, there are no minimum purchasing threshold requirements for non-USDA designated rapidly renewable products. The 50-percent minimum threshold is set by Reclamation's SBT to ensure consistent evaluation of compliance and is in effect from the date of this guidance. Purchases completed prior to this guidance must only demonstrate that preference for rapidly renewable products was included in solicitations and some amount of rapidly renewable products, as deemed cost effective, was purchased.

**Background and Strategies for Compliance:** Rapidly renewable materials are a more sustainable option than nonrenewable materials. Nonrenewable materials, such as fossil fuels-based and old-growth lumber-based products, take thousands of years to regenerate naturally. Rapidly renewable materials are products that regenerate quicker than the demand for the products. Many rapidly renewable materials, such as agricultural waste products, bamboo, cork, and hemp, perform equally as well as their nonrenewable counterparts. There are many applications for rapidly renewable materials; however, the most common applications include flooring and cabinetry. As rapidly renewable materials are an emerging market, building managers can affect their proliferation in the marketplace by helping to create the demand necessary to sustain their vitality.

**Related Requirements and Standards:**

See Section 2.a., "USDA Designated," above.

**Resources:**

See Section 2.a., "USDA Designated," above.

**c. Certified Wood**

**Guiding Principle Requirement:** *For other products, use biobased products made from certified sustainable wood products. If [these nondesignated] products meet performance requirements and are available at a reasonable cost, a preference for purchasing them should be included in all solicitations relevant to construction, operation, maintenance of, or use in the building.*

**Requirement Description and Interpretation:** If the USDA BioPreferred program has not recommended biobased content levels for a wood product, the building manager must attempt to purchase nondesignated wood products certified as sustainably harvested. Certified wood requirements apply only if a building is being modified or a substantial amount of wood is purchased for large maintenance projects. This requirement only applies since release of ET No. 10-02, effective December 31, 2009. The total purchases of wood products for building modifications or large maintenance projects since passage of the RAR must equal at least 50-percent certified wood.<sup>10</sup> If no purchases were made of certified sustainable wood products, then the

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<sup>10</sup> The RAR does not require preference or set minimum thresholds for certified wood products. The 50-percent minimum threshold is set by Reclamation's SBT to ensure consistent evaluation of compliance and is in effect from the date of this guidance. Projects completed prior to this guidance must only demonstrate that preference for certified wood was included in solicitations and some amount of certified wood, as deemed cost-effective, was included.

building can claim it meets the requirement if it can demonstrate that it has procedures in place to purchase future certified wood products.

**Evidence of Compliance:**

- Requisition data (for example, specification sheets) and purchase orders confirming certified wood products; and/or
- Relevant contracts since December 31, 2009, containing specific language for the purchase of certified wood products; and/or
- Agency or building-level purchasing policy (green purchasing plan, affirmative procurement plan) which includes preference for certified wood products or the exclusion of virgin materials from specifications; or
- Justification when certified wood products are not purchased.<sup>11</sup>

**Background and Strategies for Compliance:** Irresponsible forestry practices contribute to forest destruction, loss of wildlife habitat, soil erosion and stream sedimentation, water and air pollution, and waste generation. Using wood products certified by the Forest Stewardship Council (FSC) contributes to the long-term health and integrity of forest ecosystems by encouraging responsible forest practices.

The FSC is an international certification and labeling system for products that come from responsibly managed forests and verified recycled sources. The 100-percent FSC logo indicates that all the fiber used in the making of the product comes from forests certified by the FSC. FSC-certified wood is grown using forest management practices that protect wildlife habitat, ensure clean water, protect high-value areas, respect the rights of local communities, and do not involve social conflict, illegal logging, genetically modified trees, high-conservation-value areas, or large-scale conversions that replace native tree species with plantation trees. FSC has three labels for FSC-certified wood products: (1) 100 Percent FSC, (2) Mixed-Source FSC, and (3) Recycled FSC. Mixed-source FSC certification applies to products that have wood from FSC-certified well-managed forests, and recycled material and/or other wood that comes from noncontroversial sources. Recycled FSC-certified products contain 100-percent recycled content.

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<sup>11</sup> The RAR does not require use of form WBR 1453.303-1423-1 for rapidly renewable products or certified wood. However, the Guiding Principles go beyond RAR requirements, and justification must be provided when products were not purchased as required by the Guiding Principles.

### **Related Requirements and Standards:**

- LEED EBOM, MR Credit 3 – Sustainable Purchasing – Facility Alterations and Additions

#### **Resources:**

GreenSpec BuildingGreen, Inc., <http://www.buildinggreen.com/menus/>.

### **3. Environmentally Preferable Products**

**Guiding Principle Requirement:** *Use products that have a lesser or reduced effect on human health and the environment over their lifecycle when compared with competing products or services that serve the same purpose.*

**Requirement Description and Interpretation:** Buildings must purchase environmentally preferable products (EPP) and services in accordance with EPA's "Final Guidance on the Acquisition of Environmentally Preferable Products and Services." Products for which there is a Federal requirement or designation are found in the Green Products Compilation for Federal Procurement: <http://www.gsa.gov/portal/content/198257>. Where no Federal requirement or designation exists for a product, buildings may use and reference voluntary consensus standards, such as EPP products being developed by ANSI.

#### **Evidence of Compliance:**

- Building or bureau-level procedures for investigating, purchasing and monitoring purchases in compliance with EPA guidance; and
- Preference for EPP in contract solicitations and receipts of purchases; and
- Visual inspection of EPP on-site; or
- Justification when environmentally preferable products are not purchased.

**Background and Strategies for Compliance:** EPP is a process for comparing and selecting "products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose." EPA created

the EPP program in 1993 to help Federal officials meet preference requirements. EPA's EPP program helps Federal purchasers:

- Identify Federal requirements.
- Find and evaluate information about green products and services.
- Calculate the costs and benefits of their purchasing choices.
- Manage their green purchasing processes.

The FAR requires that agencies implement cost-effective contracting preference programs promoting energy efficiency, water conservation, and the acquisition of environmentally preferable products and services. When acquiring goods and services, agencies should strive for implementing the following environmental objectives:

- Maximize the utilization of environmentally preferable products and services (based on EPA-issued guidance).
- Promote energy efficiency and water conservation.
- Eliminate or reduce the generation of hazardous waste and the need for special material processing (including special handling, storage, treatment, and disposal).
- Promote the use of nonhazardous and recovered materials.
- Realize lifecycle cost savings.
- Promote cost-effective waste reduction when creating plans, drawings, specifications, standards, and other product descriptions authorizing material substitutions, extensions of shelf life, and process improvements.
- Promote the use of biobased products.
- Purchase only plastic ring carriers that are degradable (7 U.S.C. 8102(c)(1), 40 CFR, part 238).

The General Services Administration (GSA) offers a procurement tool called *Green Products Compilation* that contains all of the products falling within the scope of these standards ([www.gsa.gov/greenproductscompilation](http://www.gsa.gov/greenproductscompilation)).

**Related Requirements and Standards:**

- FAR Subpart 23.103(a): Sustainable Acquisitions Policy
- RAR Subpart WBR 1423.404(a)(2)(i): Affirmative Procurement Programs – Environmentally Preferable
- LEED EBOM, MR Prerequisite 1: Sustainable Purchasing Policy

**Resources:**

U.S. Environmental Protection Agency, *Environmentally Preferable Purchasing*, <http://www.epa.gov/opptintr/epp/>

U.S. Environmental Protection Agency, *EPA's Final Guidance on Environmentally Preferable Purchasing*, <http://www.epa.gov/epp/pubs/guidance/finalguidance.htm>

U.S. General Services Administration, *Green Products Compilation*, <http://www.gsa.gov/portal/content/198257>

Whole Building Design Guide, *Federal Green Construction Guide for Specifiers*, <http://www.wbdg.org/design/greenspec.php>

American National Standards Institute, *Environmentally Preferable Purchasing*, [http://www.ansi.org/government\\_affairs/laws\\_policies/epp.aspx?menuid=6](http://www.ansi.org/government_affairs/laws_policies/epp.aspx?menuid=6)

**4. Waste and Materials Management – Recycling**

**Guiding Principle Requirement:** *Provide reuse and recycling services for building occupants, where markets or on-site recycling exist. Provide salvage, reuse and recycling services for waste generated from building operations, maintenance, repair and minor renovations, and discarded furnishings, equipment, and property. This could include such things as beverage containers and paper from building occupants, batteries, toner cartridges, outdated computers from an equipment update, and construction materials from a minor renovation.*

**Requirement Description and Interpretation:** Where recycling services are available, the building must have recycling programs in place in order to meet this requirement. Where programs are not available, the building should implement waste reduction and prevention procedures as feasible.

**Evidence of Compliance:**

- Document an on-site visual inspection and/or photos confirming recycling and reuse bins; and/or
- Relevant contracts from the last 4 years contain specific language for recycling, reuse, and salvage; and/or
- Any document or data from the last 4 years demonstrating waste diversion due to recycling, reuse, or salvage; or
- Market research that recycling is not available in the area.

**Background and Strategies for Compliance:** Waste disposal through landfilling or incineration contributes significantly to the negative environmental impacts of a building. In its solid waste management hierarchy, the EPA ranks source reduction, reuse, and recycling as the three preferred strategies for reducing waste. Source reduction appears at the top of EPA's hierarchy because it reduces environmental impacts throughout the material's lifecycle, from the supply chain and use to recycling and waste disposal. Reuse of materials is ranked second because the reused materials are diverted from the waste stream and substitute for other materials with greater environmental impacts.

Although recycling does not have all the same benefits as source reduction and reuse, it diverts waste from landfills and incinerators, reduces the need for virgin materials, and provides material for new products that would otherwise be manufactured from virgin materials. Recycling of certain products, particularly batteries and fluorescent lamps, prevents toxic materials from polluting the air or ground water.

**Related Requirements and Standards:**

- EO 13423, Section 2(e)
- EO 13514, Section 2(e)(ii) and (iii)
- LEED EBOM, MR Prerequisite 2: Solid Waste Management Policy
- LEED EBOM, MR Credit 7: Solid Waste Management – Ongoing Consumables
- LEED EBOM, MR Credit 8: Solid Waste Management – Durable Goods

- LEED EBOM, MR Credit 9: Solid Waste Management – Facility Alterations and Additions

**Resources:**

U.S. Environmental Protection Agency, *Wastes – Resource Conservation – Reduce, Reuse, Recycle*, <http://www.epa.gov/epawaste/conserve/rrr/index.htm>

National Park Service, U.S. Department of the Interior, *National Park Service Solid Waste Management – Quick Reference Guide*, [http://www.nps.gov/sustainability/documents/Waste/SW\\_Ref\\_Guide\\_final.pdf](http://www.nps.gov/sustainability/documents/Waste/SW_Ref_Guide_final.pdf)

American Forest and Paper Association, *Recycling in the Workplace – Ready. Set. Go!* <http://www.paperrecycles.org/guide/workplace.html>

## 5. Ozone Depleting Compounds

**Guiding Principle Requirement:** *Eliminate the use of ozone depleting compounds where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account lifecycle impacts.*

**Requirement Description and Interpretation:** This Guiding Principle requires that buildings eliminate the use of ozone-depleting substances that are phased out. Currently, all Class I substances have been phased out of production and commercial consumption. Class II compounds are allowed in equipment manufactured prior to January 1, 2010, but are being phased out over time. An ozone-depleting substances phaseout plan, preferably within the BMP, must be in place to convert or replace equipment currently using Class I or Class II substances by FY 2020. As required by regulation, any equipment leaking Class I or Class I ozone-depleting substances must be repaired or replaced.

**Evidence of Compliance:**

- Visual inspection confirming that equipment does not use ozone-depleting substances; or
- Documented phaseout plan for Class I and Class II substances.

**Background and Strategies for Compliance:** Refrigeration equipment containing ozone-depleting substances causes significant damage to the protective ozone layer in Earth’s upper atmosphere when these compounds

are released into the atmosphere. As part of the U.S. commitment to implementing the Montreal Protocol, the EPA established regulations for responsible management of ozone-depleting substances.

Eliminating the use of ozone-depleting refrigerants in new equipment and implementing a phaseout of ozone-depleting refrigerants in existing equipment help slow the depletion of the ozone layer and reduce the effects of climate change. However, sometimes, replacement of newer equipment with equipment containing alternatives can reduce energy efficiency and increase costs. The phaseout plan must consider and balance the sustainability goals of energy performance and reduction of ozone-depleting substances.

In [Section 612\(c\)](#) of the [Clean Air Act](#), the EPA is authorized to identify and publish lists of acceptable and unacceptable substitutes for [Class I](#) or [Class II](#) ozone-depleting substances. The Significant New Alternatives Policy (SNAP) Program is EPA's program to evaluate and regulate substitutes for the ozone-depleting chemicals that are being phased out under the stratospheric ozone protection provisions of the Clean Air Act.

The characteristics of various substitutes should be carefully considered when selecting replacement or conversion equipment. Refrigerants have varying applications, lifetimes, ozone-depleting potentials (ODPs), and global warming potentials (GWPs). Choose refrigerants with short environmental lifetimes, small ODP values, small GWP values, and cooling systems designed to operate without refrigerant.

**Related Requirements and Standards:**

- Clean Air Act 1990, Sections 601-607
- 40 CFR Parts 9 and 82, Protection of Stratospheric Ozone
- FAR Subpart 23.103(a): Sustainable Acquisitions Policy – Non-ozone Depleting
- RAR Subpart WBR 1423.404(a)(2)(i)(M): Affirmative Procurement Programs – Non-Ozone Depleting Substances
- LEED EA Prerequisite 3: Fundamental Refrigerant Management
- LEED EA Credit 4: Enhanced

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**Resources:**

U.S. Environmental Protection Agency, *The Montreal Protocol on Substances that Deplete the Ozone Layer*, <http://www.epa.gov/ozone/intpol/>

U.S. Environmental Protection Agency, *The Phaseout of Ozone-Depleting Substances*, [www.epa.gov/ozone/title6/phaseout/index.html](http://www.epa.gov/ozone/title6/phaseout/index.html)

U.S. Environmental Protection Agency, *Significant New Alternatives Policy (SNAP) Program*, <http://www.epa.gov/ozone/snap/index.html>

## Focus Area: Indoor Environmental Quality

### 1. Ventilation and Thermal Comfort

#### a. *Thermal Conditions*

**Guiding Principle Requirement:** *Meet American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Standard 55-2004, Thermal Environmental Conditions for Human Occupancy.*

**Requirement Description and Interpretation:** A building meets the requirement if an assessment by a professional verifies that the building meets the most current version<sup>12</sup> of ASHRAE Standard 55 which is the most recent adopted standard at the time of renovation. Because assessment of the ASHRAE standard can be extensive and costly, Reclamation has developed a recommended approach to analyzing compliance in appendix C.

**Evidence of Compliance:**

- Documented analysis from a building professional with sufficient expertise, in accordance with Reclamation's guidance in appendix C, that demonstrates that the building is maintaining thermal comfort.

**Background and Strategies for Compliance:** The thermal comfort of building occupants is affected by several variables: environmental conditions including air temperature, radiant temperature, relative humidity and air speed, personal factors such as activity and clothing, and personal preferences. Building HVAC systems and the building envelope are designed and constructed to provide a comfortable thermal environment that promotes occupant productivity and well-being. In most cases, designing a system that complies with ASHRAE-55 is standard practice. The ASHRAE 55 standard specifies the combinations of indoor space environment and personal factors that will produce thermal environmental conditions acceptable to 80 percent or more of a space's occupants.

Figure 2 shows the acceptable operative temperature and humidity ratio. This is most applicable to occupants who are appropriately dressed and involved in light work, such as office workers.

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<sup>12</sup> As of the date of this publication, the current versions are ASHRAE Standard 55-2004 and ASHRAE Standard 62.1-2010.

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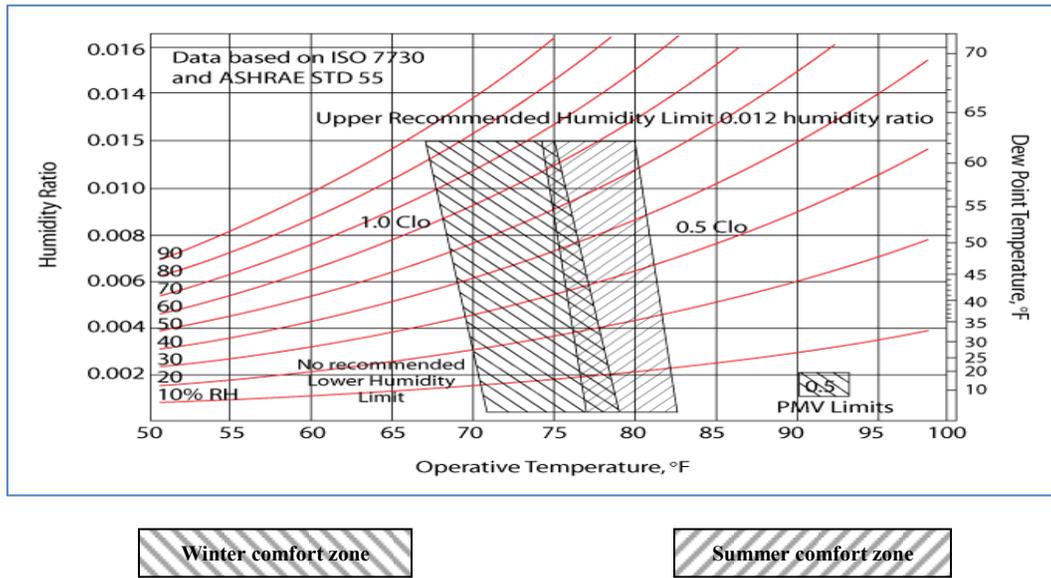


Figure 2.—Acceptable operative temperature and humidity ratio.

**Related Requirements and Standards:**

- ASHRAE 55, Thermal Environmental Conditions for Human Occupancy
- LEED EBOM, Indoor Environmental Quality (IEQ) Credit 2.3: Occupant Comfort – Thermal Comfort Monitoring

**Resources:**

ENERGY STAR, *2011 Licensed Professional's Guide to the ENERGY STAR® Label for Commercial Buildings*,

[http://www.energystar.gov/ia/business/evaluate\\_performance/pm\\_lp\\_guide.pdf?9401-d384](http://www.energystar.gov/ia/business/evaluate_performance/pm_lp_guide.pdf?9401-d384)

ANSI/ASHRAE Standard 55: *Thermal Environmental Conditions for Human Occupancy*,

<http://www.ashrae.org/resources--publications/bookstore/standard-55>

Whole Building Design Guide, *Enhance Indoor Environmental Quality*,

<http://www.wbdg.org/design/ieq.php>

**b. Ventilation**

**Guiding Principle Requirement:** *Meet American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Standard 62.1-2007: Ventilation for Acceptable Indoor Air Quality.*

**Requirement Description and Interpretation:** A building meets the requirement if an assessment by a professional verifies that the building meets the current version<sup>13</sup> of ASHRAE Standard 62.1 which is the most recent adopted standard at the time of renovation. Because assessment of the ASHRAE standard can be extensive and costly, Reclamation has developed a recommended approach to analyzing compliance in appendix D.

**Evidence of Compliance:**

- Documentation of analysis from a building professional with sufficient expertise, in accordance with appendix D, that demonstrates that the building is achieving ventilation standards.

**Background and Strategies for Compliance:** Americans spend about 90 percent of their time indoors, where concentrations of pollutants are often much higher than those outside. Of the thousands of chemicals and biological pollutants found indoors, many are known to have significant health impacts. Risks include asthma, cancer, and reproductive and developmental problems. Increasing ventilation above minimum standards improves the indoor air quality of the building's occupied spaces and directly benefits occupants' health and well-being.

Building ventilation systems, including both mechanical and natural ventilation systems, are designed and installed to introduce fresh outside air into the building while exhausting an equal amount of building air. Providing a minimum amount of outdoor air into buildings allows a building to maintain good indoor air quality and keep occupants comfortable and healthy. Underventilated buildings may be stuffy, odorous, uncomfortable, and/or unhealthful for occupants.

ASHRAE 62.1-2007 establishes the minimum requirements for ventilation air rates in various types of spaces, so as to reduce the potential for adverse health effects. The standard specifies that systems be designed to prevent uptake of contaminants, minimize growth and dissemination of microorganisms, and, if necessary, filter particulates. The standard takes into account an area's square footage, number of occupants and their activities, and the ventilation system.

In accordance with this standard, ventilation rates appropriate to the spaces must be continuously provided. HVAC systems must be continuously maintained and protected from contamination. Increasing ventilation rates can result in higher HVAC energy costs and capacity needs, so building

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<sup>13</sup> As of the date of this publication, the current versions are ASHRAE Standard 55-2004 and ASHRAE Standard 62.1-2010.

managers must balance requirements for increased ventilation with energy efficiency goals and be cautious of overventilating.

**Related Requirements and Standards:**

- ASHRAE 62.1, Ventilation Rate Procedure
- LEED EBOM, IEQ Prerequisite 1: Minimum Indoor Air Quality Performance

**Resources:**

ANSI/ASHRAE Standard 62.1: *Ventilation for Acceptable Indoor Air Quality*, <http://www.ashrae.org/standards-research--technology/standards--guidelines>

See also Section 1.a., "Thermal Conditions", above.

## **2. Moisture Control**

### **a. Control Strategies**

**Guiding Principle Requirement:** *Provide policy and illustrate the use of an appropriate moisture control strategy to prevent building damage, minimize mold contamination, and reduce health risks related to moisture.*

**Requirement Description and Interpretation:** This requirement is met when the building includes a moisture control strategy in the BMP and can demonstrate that it adequately controls building moisture. The complexity of the strategies will vary greatly depending on the climate in which the building is located. Buildings in arid climates may only require very simple procedures for addressing emergency leaks.

**Evidence of Compliance:**

- Documentation of moisture control strategies in the BMP; and
- Little or no evidence of moisture control issues (leaks, stains, mold, and mildew). If moisture control issues are present, the requirement is not met.

**Background and Strategies for Compliance:** The presence of moisture inside a building can damage building materials, lead to serious health problems for occupants, and create unpleasant odors and indoor air quality issues. Moisture issues and mold growth in buildings typically result from

one of the following: physical damage to the building from storms or flooding, elevated humidity and higher dew points that result in condensation, conditions that cause periodic saturation without allowing time for sufficient drying, and leaks, which can be from either the weather or mechanical and plumbing system malfunctions.

Mold issues are more prevalent in regions with warm, humid climates because they offer more opportunities for condensation and poor drying conditions. However, in all climates, even dry ones, mold growth can easily occur, especially in building areas with kitchens, bathrooms, and laundry facilities. If elevated moisture levels persist, these can lead to the growth of mold and bacteria, as well as infestation by insects. Persistent moisture can cause rot, corrosion, and other forms of deterioration of building materials.

To reduce the exposure of building occupants to moisture issues and mold, strategies must be in place to limit the introduction of moisture and eliminate the potential for condensation. Condensation occurs when moist air comes into contact with surfaces that are at or below the dew point temperature, causing water vapor to change to liquid. Moisture control strategies for building operations may include, but are not limited to, the following:

- Prevent condensation.
- Conduct regular inspections of building materials and components, and implement appropriate ventilation and humidity controls.
- Conduct ongoing systems maintenance.
- Immediately repair leaks and failed equipment.
- Immediately repair drainage problems.
- Implement mold mitigation techniques, including appropriate set points for HVAC, removing moisture damaged furniture and items, and thoroughly cleaning frequently wet areas.
- Implement moisture control strategies for renovations and remodeling projects.

**Related Requirements and Standards:** None.

**Resources:**

U.S. Environmental Protection Agency, *Building Air Quality: A Guide for Building Owners and Facility Managers*, [http://www.epa.gov/iaq/largebltdgs/baq\\_page.htm](http://www.epa.gov/iaq/largebltdgs/baq_page.htm)

U.S. Environmental Protection Agency, *Building Air Quality: A Guide for Building Owners and Facility Managers*, Appendix C: Moisture, Mold, and Mildew, [http://www.epa.gov/iaq/largebltdgs/pdf\\_files/appenc.pdf](http://www.epa.gov/iaq/largebltdgs/pdf_files/appenc.pdf),

Oak Ridge National Laboratory Buildings Technology Center, *WUFI-ORNL/IBP*, for calculating the coupled heat and moisture transfer in building components, <http://www.ornl.gov/sci/btc/apps/moisture/>

Whole Building Design Guide, *Mold and Moisture Dynamics*, <http://www.wbdg.org/resources/moisturedynamics.php>

U.S. Environmental Protection Agency, *Mold Remediation in Schools and Commercial Buildings*, for guidelines to remedy mold and moisture problems, [http://www.epa.gov/mold/mold\\_remediation.html](http://www.epa.gov/mold/mold_remediation.html)

**b. Dew Point Analysis**

**Guiding Principle Requirement:** *For façade renovations, a dew point analysis and a plan for cleanup or infiltration of moisture into building materials are required.*

**Requirement Description and Interpretation:** This requirement only applies if there is a façade renovation.

**Evidence of Compliance:** Evidence of dew point analysis and cleanup or infiltration plans must be shown in project design documents or contracts.

**Background and Strategies for Compliance:** A dew point analysis illustrates the components of the building envelope, including exterior wall, roof, ceiling, and floor assemblies; identifies the surfaces where condensation may occur; and determines the risk for moisture problems. Assembly components are analyzed based on thickness, permeability to vapor transmission, and thermal resistance (R-value) to determine the following: where the dew point will occur, where the primary vapor retarder will be located, and how far moisture will be allowed to penetrate.

The dew point analysis is necessary for maximum moisture control because this helps identify assembly components that may trap moisture. Modifications can be made within the building envelope assemblies to prevent moisture issues or mold growth.

A plan for cleanup of infiltration of moisture into building materials includes many of the strategies and resources listed in Section 2.a., "Moisture Control - Control Strategies."

**Related Requirements and Standards:**

- LEED EBOM, IEQ Credit 1.1: Indoor Air Quality Best Management Practices – Indoor Air Quality Management

**3. Daylighting**

**a. Automatic Controls**

**Guiding Principle Requirement:** *Automated lighting controls (occupancy/vacancy sensors with manual-off capability) are provided for appropriate spaces including restrooms, conference and meeting rooms, employee lunch and break rooms, training classrooms, and offices.*

**Requirement Description and Interpretation:** The intent of this Guiding Principle is to better manage lighting in infrequently used spaces and increase energy efficiency. If sensors are in all appropriate spaces, then the requirement is met. If the assessment determines that sensors may be appropriate for a space and there is no justification for why sensors should not be implemented, then the requirement is not met.

**Evidence of Compliance:**

- Documented on-site visual inspection and/or photos confirming automated lighting controls; and/or
- Electrical/lighting plans show automated lighting controls; and/or
- Schematic of floor layout shows lighting controls; and/or
- Other documentation that demonstrates compliance; and
- If any space is deemed inappropriate, written justification.

**Background and Strategies for Compliance:** Lighting in commercial buildings can account for more than 25 percent of a building's total energy use and 35 percent of the electricity consumption. Much of this energy is wasted on unnecessary lighting associated with inadequate controls. The simplest way to reduce the amount of energy consumed by lighting systems is to turn lights off when they are not needed. All electric lights come with a manual switch for that purpose, but these switches are not always used as

often as they could be. The inclusion of automatic lighting controls, such as occupancy sensors and daylight sensors, can provide a more efficient lighting system.

Occupancy sensors pick up on the presence of occupants within a space and automatically turn lights on and off. They are most effective in spaces where people move in and out frequently in unpredictable patterns, such as private offices, restrooms, and conference rooms. Occupancy sensors are less effective in open office areas where one or more people may be present throughout the day or in reception areas, corridors, or lobbies that are frequently occupied. The most common type of occupancy sensors are either ceiling mounted or wall-switch mounted. They also help to reduce maintenance costs by lengthening the relamping interval. Turning fluorescent lights off for 12 hours each day can extend their life by 75 percent, or to nearly 7 years.

Efficient lighting begins with using as much daylight as possible. Natural daylight has been shown to improve the quality of an indoor environment while reducing energy use and peak demand. Daylight sensors are automatic controls that measure local light levels and adjust or reduce electric light levels when enough daylight is available.

After installation of automatic lighting controls, a plan should be developed to monitor the performance of the systems, including occupant survey feedback, ongoing monitoring, and a schedule for regular testing of components. This will prevent unintended energy use after hours due to faulty sensors and other issues. Occupants should be educated to properly use the controls and to turn them off during hours when the building is not occupied or the space is not being used.

**Related Requirements and Standards:** None.

**Resources:**

U.S. Environmental Protection Agency, ENERGY STAR<sup>®</sup>, *Building Upgrade Manual*, Chapter 6: Lighting, [http://www.energystar.gov/index.cfm?c=business.bus\\_upgrade\\_manual](http://www.energystar.gov/index.cfm?c=business.bus_upgrade_manual)

**b. Daylighting Factor/Lighting Controls**

**Guiding Principle Requirement:** *Use one of the options below to meet additional daylighting and lighting controls performance expectations.*

*Option 1: Achieve a minimum daylight factor of 2 percent (excluding all direct sunlight penetration) in 50 percent of all space occupied for critical visual tasks.*

*Option 2: Provide occupant controlled lighting, allowing adjustments to suit individual task needs, for 50 percent of regularly occupied spaces.*

**Requirement Description and Interpretation:** The intent of this Guiding Principle is to enhance indoor environmental quality by providing building occupants daylighting and the ability to control lighting in their spaces. Buildings should assess compliance against Option 1 first. If this cannot be met, than Option 2 may be used to meet the requirement. A building is in compliance with Option 1 if visual inspection and accurate readings of daylight indicate that the requirement is met. Daylight readings may be measured in a sample of the various types of occupied spaces in the building and applied to the other spaces if they are of similar design and building location. If the sample readings are close to the required daylighting factor, then samples must be taken in additional spaces to ensure compliance. To meet Option 2, the presence of occupant controlled task lighting may be inspected in a sample of the various types of occupied spaces and applied to other spaces if the building manager confirms they are designed and managed similarly.

**Evidence of Compliance:**

For Option 1, the evidence is:

- Values of all daylight readings samples with time of day recorded and the sample locations where measurements were taken; and
- Estimated percentage of the spaces achieving the minimum daylight factor.

For Option 2, the evidence is the calculated percent of occupied spaces meeting controlled lighting requirements.

**Background and Strategies for Compliance:** Option 1 – Daylighting: The indoor quality of buildings can be improved by allowing occupants exposure to natural light and a connection to the outdoors. The introduction of daylight into a building also reduces the electric lighting requirements and, therefore, decreases energy costs.

A daylight factor of 2 is a typical level to achieve for an office space. It assumes that 2 percent of the total light that is outside the building ends up on the working plane or desktop. Assuming an average outdoor illuminance of 2500 footcandles (fc) and a daylight factor of 2 percent, the indoor illuminance on a desktop would be 50 fc ( $.02 \times 2500 \text{ fc} = 50 \text{ fc}$ ). As such, the minimum daylight illumination level of 50 fc must be measured in at least 50 percent of all regularly occupied spaces in the building.

The daylight factor can be demonstrated through field measurements of indoor light levels. Calculations based on building design can also be used to determine compliance with this requirement, based on the window area, floor area, and visible light transmittance of the window glazing. Glare control is also required at each window; measures include interior adjustable blinds, light shelves, louvers, fins, and shades.

**Option 2 – Lighting Controls:** Providing occupants with a high level of lighting system control and enabling individual occupants or groups in multioccupant spaces to adjust lighting levels to suit their individual needs promotes productivity, comfort, and well-being while also reducing the overall lighting energy consumption of the building. Many buildings only have fixed-intensity general lighting systems that illuminate indoor spaces without consideration for specified tasks and individual occupant needs. Giving occupants the ability to turn down or off lights when they are not needed can reduce electricity use. Simple switch controls can be provided to meet this requirement, or more sophisticated controls with dimming capabilities can be provided, which can increase energy savings and further enhance occupant comfort.

**Related Requirements and Standards:**

- LEED EBOM, IEQ Credit 2.4: Daylight and Views
- LEED EBOM, IEQ Credit 2.2: Controllability of Systems – Lighting

**Resources:**

Whole Building Design Guide, *Electric Lighting Controls*,  
<http://www.wbdg.org/resources/electriclighting.php>

Whole Building Design Guide, *Daylighting*,  
[http://www.wbdg.org/references/mou\\_daylight.php](http://www.wbdg.org/references/mou_daylight.php)

#### 4. Low-Emitting Materials

**Guiding Principle Requirement:** *Use low-emitting materials for building modifications, maintenance, and cleaning. In particular, specify the following materials and products to have low pollutant emissions: composite wood products, adhesives, sealants, interior paints and finishes, solvents, carpet systems, janitorial supplies, and furnishings.*

**Requirement Description and Interpretation:** The building must have procedures in place for investigating and purchasing low-emitting products, where

available. A sample of potential volatile organic compound (VOC)-emitting products purchased for modifications, maintenance, and cleaning since distribution of Reclamation's Sustainable Building Implementation Plan (SBIP) will be evaluated. If the products sampled contain high emissions and could have been replaced with alternative, lower-emitting products, or if there are no procedures in place to consider low-emitting products, then this requirement is not met.

**Evidence of Compliance:**

- Visual inspection of low-VOC purchases; or
- Requisition data; for example, solicitations, specification sheets, purchase orders, and contracts containing specific language for the purchase of low-emitting materials, including durable goods, consumables, renovations, repairs, and green cleaning supplies; and/or
- Building-level purchasing policy (green purchasing plan, affirmative procurement plan) and procedures (acquisition checklists) including preference for low-emitting products.

**Background and Strategies for Compliance:** Mandatory purchasing requirements have not yet been stipulated in the FAR or the Department of the Interior's *Affirmative Procurement Program, Green Purchasing Plan*, (Green Purchasing Plan) dated June 2008. However, per EO 13423 and the Green Purchasing Plan, preference will be given to purchasing products with low or nontoxic hazardous constituents. The facility manager should maintain an ongoing list of products that are used in the building and the products' chemical content.

Many building materials and products used in buildings are potential sources of indoor environmental contamination. The most prominent of these, VOCs, contribute to smog generation and air pollution, as well as negatively affect the health of building occupants. VOCs react with sunlight and nitrogen oxides in the atmosphere to form ground-level ozone, a chemical that has detrimental effects on human health, agricultural crops, forests, and ecosystems. All materials that emit contaminants that might enter the indoor air are considered indoor contaminant sources, including flooring, ceiling tiles, adhesives, paints, composite wood products, interior furnishings, and ventilation system components. Using low-emitting materials will reduce exposure to VOCs and other contaminants.

Source control and ventilation are the two most important strategies for minimizing the impact of building materials and products on indoor air

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quality. To control the source, specify materials that release fewer and less harmful chemical compounds. Additional measures that may be implemented are as follows:

- Avoid products containing formaldehyde (carpet, wall panels, and cabinetry).
- In areas where it is prevalent, include measures to control and mitigate radon buildup.
- Create safe, secure storage areas for housekeeping chemicals. Directly exhaust housekeeping areas to isolate odors.
- For renovations, isolate and consider negatively pressurizing the construction area if work is being performed that would result in dust, fumes, or odors. If conditioned air is required due to high end of finishing work, the air should be directly exhausted to the exterior.

Table 1 indicates common materials and products used for building modifications, maintenance, and cleaning, and the associated standard that establishes maximum allowable VOC content.

**Table 1.—Common Materials and Products Used for Building Modifications, Maintenance, and Cleaning and the Associated Standard that Establishes Maximum Allowable VOC Content**

Product	Standard
Adhesives, sealants, and sealant primers	South Coast Air Quality Management District (SCAQMD), Rule No. 1168, <i>Adhesive and Sealant Applications</i> , <a href="http://www.aqmd.gov/rules/reg/reg11/r1168.pdf">www.aqmd.gov/rules/reg/reg11/r1168.pdf</a>
Aerosol adhesives	Green Seal Standard for Commercial Adhesives, G-36, <a href="http://www.greenseal.org/Portals/0/Documents/Standards/GS-36/GS-36_Adhesives_for_Commercial_Use_Standard_Second_Edition.pdf">http://www.greenseal.org/Portals/0/Documents/Standards/GS-36/GS-36_Adhesives_for_Commercial_Use_Standard_Second_Edition.pdf</a>
Architectural paints	Green Seal Standard GS-11, Paints and Coatings, <a href="http://www.greenseal.org/Portals/0/Documents/Standards/GS-11/GS-11_Paints_and_Coatings_Standard.pdf">http://www.greenseal.org/Portals/0/Documents/Standards/GS-11/GS-11_Paints_and_Coatings_Standard.pdf</a>
Anticorrosive paints	Green Seal Standard GC-03, Anticorrosive Paints, <a href="http://www.greenseal.org/Portals/0/Documents/Standards/GS-11%20Stn%20Dev/anti-corrosivepaints.pdf">http://www.greenseal.org/Portals/0/Documents/Standards/GS-11%20Stn%20Dev/anti-corrosivepaints.pdf</a>
Architectural coatings: clear wood finishes, floor coatings, stains, primers, and shellacs	SCAQMD Rule No. 1113, <i>Architectural Coatings</i> , <a href="http://www.aqmd.gov/rules/reg/reg11/r1113.pdf">www.aqmd.gov/rules/reg/reg11/r1113.pdf</a>
Carpet	Carpet and Rug Institute, Green Label Program, <a href="http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/">http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/</a>
Carpet cushion	Carpet and Rug Institute, Green Label Program,

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**Table 1.—Common Materials and Products Used for Building Modifications, Maintenance, and Cleaning and the Associated Standard that Establishes Maximum Allowable VOC Content**

Product	Standard
	<a href="http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/">http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/</a>
Hard surface flooring: vinyl, linoleum, laminates, wood, ceramic, rubber, and wall base	Resilient Floor Covering Institute, Floorscore Standard, <a href="http://www.rfci.com/index.php?option=com_content&amp;view=article&amp;id=4&amp;Itemid=4">http://www.rfci.com/index.php?option=com_content&amp;view=article&amp;id=4&amp;Itemid=4</a>
General-purpose, bathroom, glass, and carpet cleaners	Green Seal GS-37
Cleaning and degreasing compounds	Environmental Choice CCD-110
Hard surface cleaners	Environmental Choice CCD-146
Carpet and upholstery care	Environmental Choice CCD-148
Industrial and institutional floor care products	Green Seal GS-40
Biological digestion additives for cleaning and odor control	Environmental Choice CCD-112 and the California Air Resource Board (CARB)
Drain or grease trap additives	Environmental Choice CCD-113 and the CARB
Odor control additives	Environmental Choice CCD-115 and the CARB
Hard floor care	Environmental Choice CCD-147 and the CARB

**Related Requirements and Standards:**

- LEED EBOM, IEQ Prerequisite 3: Green Cleaning Policy (to reduce human exposure to potentially hazardous chemicals)
- LEED EBOM, IEQ Credit 3.3: Purchase of Sustainable Cleaning Products and Materials

**Resources:**

Whole Building Design Guide, Technical Guidance, *Low-Emitting Materials*,  
[http://www.wbdg.org/references/mou\\_lem.php](http://www.wbdg.org/references/mou_lem.php)

## 5. Pest Management

### a. Techniques

**Guiding Principles Requirement:** Use integrated pest management (IPM) techniques as appropriate to minimize pesticide usage.

**Requirement Description and Interpretation:** The intent of this Guiding Principle is to use IPM techniques in the maintenance regime of buildings in a manner that reduces risks from both the pests and associated pest management activities for the lifecycle of the building and site. For this requirement to be met, the building must implement IPM procedures and must specify use of a variety of alternative, less toxic strategies to control pests. IPM procedures may reside in the BMP.

**Evidence of Compliance:**

- Use of only IPM techniques and EPA-registered pesticides on the building and grounds; and/or
- Requirement for IPM techniques and EPA-registered pesticides included in the building-level management plan or other plan.

**Background and Strategies for Compliance:** IPM is a process for determining if a management action is needed against a pest and, if so, the timing, type, and frequency of strategies employed and the effectiveness of treatments. IPM techniques incorporate environmental best management practices into daily O&M to significantly reduce harmful chemical use, air pollution, and chemical runoff when compared with standard practices. For example, standard practices use pesticides as a first strategy to combat pests. IPM attempts to find alternative ways to address pests, reduce pesticide applications, or, if required, use least-toxic pesticides and perform universal notification.

IPM best management practices include the following:

- Emphasize nonchemical control methods to prevent the establishment of pests and invasive species. This might include the use of weed-free certified seed, weed debris removal and disposal, equipment sanitation, quarantines, and use of weed-free forage and mulch.
- Continuously monitor pests before treating to determine when pest management should be initiated. This may include site inspections,

a survey of existing invasive species, pest inspection, and pest population monitoring. Evaluate strategies to determine level of success when used.

- Use least-toxic pesticides. When monitoring reveals a need for the use of pest control, evaluate options and employ the least toxic option. There are many university extension services, public service organizations, and local governments that provide information on less toxic pesticides.
- Determine emergency conditions. Another IPM technique includes determining what constitutes an emergency condition and when pesticides may be applied without following the previous methods. For example, infestation of a certain species or specific situations that directly affect occupant health may be considered emergency conditions.
- Perform universal notification. If a pesticide other than a least-toxic pesticide is applied on-site, the building and/or vendor must notify building occupants at least 72 hours in advance under normal circumstances, and 24 hours for emergency applications. Methods include posting signage or other means of communicating to 100 percent of occupants. This allows occupants and staff, especially high-risk occupants such as pregnant women and the elderly, to modify their plans based on pesticide usage at the building. Notification will include the pesticide name, active ingredients, product labels ("caution," "danger"), time and location of application, and contact information for additional information regarding the application.
- Conduct tracking. Documentation is required to demonstrate ongoing compliance with the IPM techniques. All applications of pesticides, including least-toxic pesticides, must be documented. Tracking should include the application date, time, method, and location; universal notification date, time, and method; targeted pest; pesticide product name, active ingredient, EPA registration number, and toxicity.
- Employ a pest management and landscape maintenance vendor that practices a prevention-based, least-toxic approach to managing pests. Consider hiring a contractor certified by Eco-Wise, a Green Shield third-party organization, or similar. Refer to the Web site for additional information: <http://www.ecowisepestcontrol.com/>.

- Modify vendor contracts to include specific language describing their role in the building’s IPM techniques.

**Related Requirements and Standards:**

- LEED EBOM, IEQ Credit 3.6: Green Cleaning – Indoor Integrated Pest Management

**Resources:**

U.S. Environmental Protection Agency, *Summary of the Federal Insecticide, Fungicide, and Rodenticide Act*, <http://www.epa.gov/lawsregs/laws/fifra.html>

U.S. Environmental Protection Agency, *Integrated Pest Management (IPM) Principles*, <http://www.epa.gov/opp00001/factsheets/ipm.htm>

U.S. General Services Administration, *Integrated Pest Management*, <http://www.gsa.gov/ipm>

U.S. Department of the Interior, U.S. Fish and Wildlife Service, *Integrated Pest Management: Guidance for Preparing and Implementing Integrated Pest Management Plans*, <http://www.fws.gov/contaminants/Documents/GuidanceIPMPlan.pdf>

U.S. Bureau of Reclamation, *Integrated Pest Management Manual for Effective Management on Reclamation Facilities*, November 2008

**b. Pesticides**

**Guiding Principle Requirement:** *Use EPA-registered pesticides only when needed.*

**Requirement Description and Interpretation:** For this requirement to be met, the use of EPA-registered pesticides must be limited to an as-needed basis.

**Evidence of Compliance:**

- Documented IPM procedures and contract specifications for pest control services that require environmentally friendly pest control solutions and use of EPA-registered pesticides only when needed.
- If there is evidence of the use of non-EPA-registered pesticides or frequent application of EPA-registered pesticides without regard for need, the requirement is not met.

**Background and Strategies for Compliance:** A pesticide cannot be legally used if it has not been registered with EPA’s Office of Pesticide Programs.

It is important to use only the amount of EPA-registered pesticides needed and limit use to targeted locations and only for the targeted species. Consider using least-toxic pesticides as much as feasible. To determine if a pesticide has been federally approved by EPA, look for an EPA registration number (sometimes written as EPA Reg. No.) on the label. Another way to search for the registration status of pesticides is through searching EPA's pesticide product label system. You can search by product name, EPA registration number, or company name.

#### **Related Requirements and Standards:**

- Federal Insecticide, Fungicide, and Rodenticide Act 1996

#### **Resources:**

U.S. Environmental Protection Agency, *Summary of the Federal Insecticide, Fungicide, and Rodenticide Act*, <http://www.epa.gov/lawsregs/laws/fifra.html>

## **6. Environmental Tobacco Smoke**

### **a. Inside**

**Guiding Principle Requirement:** *Implement a policy and post signage indicating that smoking is prohibited within the building.*

**Requirement Description and Interpretation:** The intent of this Guiding Principle is to prohibit environmental tobacco smoke (ETS), or secondhand smoke, from entering a building. Reclamation has adopted Federal nonsmoking regulations. For this requirement to be met, this policy must be documented and signs posted inside the building.

#### **Evidence of Compliance:**

- Visual confirmation of no-smoking signs and adherence to the policy.

**Background and Strategies for Attaining Compliance:** The purpose of this requirement is to prevent exposure of building occupants, indoor surfaces, and ventilation air distribution systems to ETS. ETS is produced by burning cigarettes, pipes, or cigars and contains thousands of different compounds, many of which are known carcinogens. Many health risks, including lung disease, cancer, and heart disease, have been documented as a result of exposure to ETS. Smoking within a building contaminates the indoor air and can cause occupant reactions such as irritation, illness, and

decreased productivity. By prohibiting smoking indoors, occupants will have less exposure to ETS and, therefore, a healthier indoor environment.

Reclamation currently has a policy prohibiting smoking inside its buildings. The RAR WBR 1423.800 implements EO 13058 requirements, which establish a smoke-free environment for Federal employees and members of the public visiting or using Federal facilities. As a result of this executive order, the smoking of tobacco products is prohibited in all interior space owned, rented, or leased by the executive branch of the Federal Government. The following activities must be undertaken to achieve compliance:

- Communicate the building’s smoking policy to all occupants. Post information about the building’s nonsmoking policy for all occupants to read and post signage indicating that no smoking is allowed inside the building.
- Establish a plan for enforcement and designate the person responsible for implementing the policy. Enforcing the building policy is typically the responsibility of the facility manager.
- If necessary, provide appropriately located and designated smoking areas outside the building away from entrances, operable windows, and ventilation systems.

**Related Requirements and Standards:**

- EO 13058, *Protecting Federal Employees and the Public From Exposure to Tobacco Smoke in the Federal Workplace*
- RAR, Subpart WBR 1423.80, *Protecting Federal Employees and the Public From Exposure to Tobacco Smoke in the Federal Workplace*

**Resources: None**

**b. Outside**

**Guiding Principle Requirement:** *Implement a policy and post signage indicating that smoking is prohibited within 25 feet of all building entrances, operable windows, and building ventilation intakes during building occupancy.*

**Requirement Description and Interpretation:** Reclamation has adopted Federal no-smoking regulations. For this requirement to be met, signs must

be posted outside stating that smoking is not allowed within 25 feet of the building. Smoking shelters cannot be within 25 feet of any building air intake.

**Evidence of Compliance:**

- Visual confirmation of signs prohibiting smoking within 25 feet of the buildings and location of smoking areas at least 25 feet away from air intakes.

**Background and Strategies for Attaining Compliance:** The purpose of this requirement is to prevent exposure of building occupants to ETS at building entrances and through building ventilation air distribution systems. In addition to indoor no-smoking policy, Federal Management Regulation (FMR) Bulletin 2009-B 1, effective December 22, 2008, further prohibits smoking in front of air intake ducts at all executive-owned buildings and in courtyards and outdoor spaces within 25 feet of doorways and air intake ducts of buildings under the jurisdiction, custody, or control of GSA. Smoking boundaries will increase the quality of air around the building perimeter and therefore decrease the risk to occupants' health.

**Related Requirements and Standards:**

- Federal Management Regulation (FMR) Bulletin 2009-B 1, December 22, 2008, *Protecting Federal Employees and the Public From Exposure to Tobacco Smoke in the Federal Workplace*

**Resources: None**



## Focus Area: Sustainable Sites (Reclamation-Specific Requirements)

All requirements under this section are Reclamation-only initiatives and focus areas. Although these initiatives must be treated as requirements and assessed for compliance in a sustainable building assessment, they are not required to claim full compliance with the Guiding Principles.

### 1. Heat Island Effect

#### a. *Non-roof*

**Guiding Principle Requirement:** *Reduce the heat island effect from hardscapes by considering one or more of the following techniques: shading from trees, structures with solar panels, reflective hardscape materials with solar reflectance index (SRI) of at least 29, and open grid pavement systems.*

**Requirement Description and Interpretation:** The site must be investigated to determine where non-roof hardscapes meet the requirements. Compliance is achieved when shading of heat island type hardscapes or use of reflective materials is implemented to the greatest extent feasible and cost effectively. The building management should strive to mitigate 50-percent heat island type hardscapes. The most economically reasonable option is to plant trees to provide shading. If this or other mitigation measures are not currently feasible or cost effective, policies or plans to address non-roof heat island effect must be developed in the BMP or other documents to be considered during future modifications. If no mitigation measures, plans, or policies are in place to address heat island effect, then the requirement is not met until such time that plans or policies are in place to address heat island effect and measures are implemented during a future modification. Mitigating heat island effect may not be appropriate for certain, more northern climate zones.

#### **Evidence of Compliance:**

- Actual measurement of the percent of hardscapes mitigated by shading and inventory of the reflective hardscape materials with an SRI of 29 or greater; or
- Policies, plans, or specification requirements in place to address heat island effect during future modifications; or

- Written justification that a building is in a climate zone where hardscapes, roofs, and wall surfaces do not contribute to the heat island effect.

**Background and Strategies for Compliance:** The goal of this requirement is to reduce heat islands to minimize the impact on microclimates, building energy demands, and wildlife habitat. The common use of dark, nonreflective surfaces for parking, walkways, and other hardscapes contributes to the heat island effect by absorbing the sun’s warmth, which then radiates into the surroundings. Elevated temperatures push up the demand for air-conditioning in summer, resulting in increased cooling loads that require larger HVAC equipment and greater electricity consumption, both of which generate greenhouse gases and pollution. Therefore, reducing heat islands can greatly lower cooling costs.

Additionally, plants and animals are sensitive to large fluctuations in day and night temperatures and may not thrive in areas affected by heat islands. According to the EPA, heat islands form as cities replace natural land cover with pavement, buildings, and other infrastructure. Trees are displaced and vegetation minimized, which takes away the natural cooling effects of shading and evaporation of water from soil and leaves. Although heat island refers to the local temperature differences between urban and surrounding rural areas, urban and rural warming trends are very similar.

SRI is the measure of a surface’s ability to reflect solar heat.<sup>14</sup> Higher reflectivity is desirable because it will help combat the heat island effect. Dark surfaces have an SRI near zero, while light surfaces have an SRI near 100.

LEED Green Building Rating System for Existing Buildings requires the application of heat island best management practices on a minimum of 50 percent of hardscapes, or a minimum of 50 percent of parking spaces placed under cover. Although this exact percent coverage is not required by this requirement, building management should strive to increase the percent of hardscapes that reduce heat-island affect to 50 percent or more through a combination of the following strategies:

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<sup>14</sup> The SRI is a measure of a constructed surface’s ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black surface (reflectance 0.05, emittance 0.90) is 0, and a standard white surface (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM International (formerly known as American Society for Testing of Materials) [ASTM] E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

- Provide shade from the existing tree canopy or new landscaping.
- Provide shade from structures covered by solar panels that produce energy used to offset nonrenewable energy sources.
- Provide shade from architectural structures that have an SRI of 29 or greater, and implement a maintenance program that ensures that these surfaces are cleaned at least every 2 years to maintain reflectivity.
- Provide hardscape materials that have an SRI of 29 or greater.
- Use an open-grid pavement system that is at least 50-percent pervious.

Vegetation can reduce heat islands by providing shade that can keep the building and hardscape from heating up, as well as by cooling the air through evapotranspiration. Cool pavement, such as gray or white concrete, typically has a higher solar reflectance than standard paving materials such as asphalt, and it can minimize the absorption of solar heat. Because higher reflectance pavements increase the overall light levels and can result in glare, evaluate the impact on the site prior to installation.

Limit the amount of impervious hardscape areas on the site to help reduce heat island effect. Porous pavement allows water to filter into the ground, keeping pavements cool when moist.

#### **Related Requirements and Standards:**

- LEED EBOM, SS Credit 7.1: Heat Island Reduction – Non-roof

#### **Resources:**

U.S. Environmental Protection Agency, *Urban Heat Island Mitigation*, <http://www.epa.gov/heatisld/mitigation/index.htm>

ANSI/ASHRAE/USGBC/IES Standard 189.1-2009, *Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings*, Section 5.3.2, –Mitigation of the Heat Island Effect”, <http://www.ashrae.org>

ANSI/ASHRAE/USGBC/IESNA Standard 90.1-2007, *Energy Standard for Buildings Except Low-Rise Residential Buildings*, <http://www.ashrae.org>

**b. Roof**

**Guiding Principle Requirement:** *Reduce the heat island effect from roofs by considering one or more of the following techniques: cool roofs, green roofs, and solar panels on roofs, and designing at least one technique now to be implemented the next time the roof is replaced.*

**Requirement Description and Interpretation:** The roofing material must have an SRI of 29 for steep sloping roofs and 78 for low sloping roofs in accordance with LEED SS Credit 7.2, or mitigation measures as described in the requirement above must be in place in order to be in compliance. If not currently cost effective, plans to implement cool roof strategies must be developed in the BMP or other document to be considered during a future modification. If no mitigation measures or plans are in place to address roof heat island effect, then the requirement is not met until such time that the building management develops a plan to address heat island effect in future modifications.

**Evidence of Compliance:**

- Actual measurement and analysis of roof SRI and determination of reflective roof material greater than 29 or visual inspection of mitigation measures implemented; or
- Policies, plans, or specification requirements in place to address heat island effect during future modifications; or
- Written justification that a building is in a climate zone where hardscapes, roofs, and wall surfaces do not contribute to the heat island effect.

**Background and Strategies for Compliance:** Like non-roof heat island effect, the goal for this requirement is to reduce heat islands to minimize the impact on microclimates, energy demand, and wildlife habitats. To meet this requirement, managers should strive to implement strategies required under the LEED Green Building Rating System for Existing Buildings for roofs:

- Provide a light-colored roof with a high SRI for at least 75 percent of the roof area. A steep-sloped roof must have an SRI greater than 29 in order to be eligible for the credit, while a low-sloped roof must have an SRI greater than 78.
- Provide a green roof on at least 50 percent of the roof area.

Consider applying a cool roof coating if roof replacement is not needed. If a roof replacement is needed, specify SRI-compliant roof systems or consider a green roof.

A vegetated roof replaces heat-absorbing surfaces with plants, shrubs, and small trees and cools the air through the evaporation of water from leaves, while keeping the building's heat gain low. Additional benefits include retaining stormwater, insulating benefits, aesthetically appealing, have longer lifetimes than conventional roofs, and often require less maintenance.

**Related Requirements and Standards:**

- LEED EBOM, SS Credit 7.2: Heat Island Reduction – Roof

**Resources:**

U.S. Department of Energy, *Guidelines for Selecting Cool Roofs*, July 2010, <http://www1.eere.energy.gov/femp/pdfs/coolroofguide.pdf>

U.S. Green Building Council, LEED Reference Guide for Green Building Operations and Maintenance 2009, Credit 7.1: Heat Island Reduction—Non-roof, and Credit 7.2: Heat Island Reduction – Roof, <http://www.usgbc.org>

## 2. Light Pollution

**Guiding Principle Requirement:** *Minimize light pollution from both inside and outside the building. Minimize light crossing site boundaries and shining above the horizontal to ensure a dark night sky.*

**Requirement Description and Interpretation:** The site must be investigated to determine the level of light pollution. If the building does not meet the requirement, the building manager must have a plan in place to address light pollution within the next 5 years. If there are no plans in place, or if light pollution plans were not addressed within 5 years from the date of the declaring conformance with the Guiding Principles, then the requirement will be marked as not met.

**Evidence of Compliance:**

- A site map or analysis showing light readings meeting the requirements; or
- A plan to mitigate light pollution must be in place to address deficiencies found in a comprehensive light pollution analysis.

**Background and Strategies for Compliance:** This requirement seeks to minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact from lighting on nocturnal environments. Light pollution includes both interior and exterior lighting and is defined as waste light from building sites that produces glare, is directed upward to the sky, or is directed off the site. Waste light does not increase nighttime safety, utility, or security, and it needlessly consumes energy.

Outdoor lighting is important for human safety. Illuminating connections between buildings and sidewalks, parking lots, and roadways is necessary for nighttime use. However, light pollution represents nighttime lighting that is not needed. Too much exterior lighting can actually make areas less safe by creating high contrast between lit and unlit spaces. Safe, efficient, aesthetically pleasing exterior lighting should provide low contrast and no glare, and should prevent light from spilling off the site, as well as reduce infrastructure costs and energy use when compared with standard exterior lighting solutions.

The LEED Green Building Rating System for Existing Buildings requires that all nonemergency interior lighting with a direct line of sight to any openings in the building envelope be automatically controlled to turn off after hours, as well as one of the following: light fixtures greater than 50 watts should be shielded so they do not directly emit light into the night sky, or measurements show that exterior lighting does not increase site perimeter light levels by more than 20 percent.

**Related Requirements and Standards:**

- LEED EBOM, SS Credit 8: Light Pollution Reduction

**Resources:**

ANSI/ASHRAE/IESNA Standard 90.1-2007, *Energy Standard for Buildings Except Low-Rise Residential*, Section 9, "Lighting,"

ANSI/ASHRAE/USGBC/Illuminating Engineering Society Standard 189.1-2009, *Standard for the Design of High-Performance Green Buildings*, Section 5.3.3, —"Reduction of Light Pollution," <http://ashrae.org>

Illuminating Engineering Society (IES), IES TM-15-2007: Backlight, Uplight, and Glare Ratings; IES RP-33: Lighting for Exterior Environments; IES RP-20: Lighting for Parking Facilities; IES Lighting Handbook, Tenth Edition, *Lighting for Exterior Environments*, <http://ies.org>

The Dark Sky Society, *Guidelines for Good Exterior Lighting Plans*, 2009, <http://www.darkskysociety.org/handouts/LightingPlanGuidelines.pdf>

### 3. Composting

**General Principle Requirement:** *Provide composting services for compostable waste (Reclamation-specific requirement and EO 13514 goal).*

**Requirement Description and Interpretation:** Where composting services are available, the building management must consider implementing a composting program if there is sufficient amount of composting material generated.

**Evidence of Compliance:**

- Document an on-site visual inspection and/or photos confirming composting; or
- Relevant contracts from the last 4 years containing specific language for composting services; or
- Justification or determination that composting services are not available or composting is not feasible.

**Background and Strategies for Compliance:** Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment. Office buildings have the potential to generate significant amounts of compost from used coffee grounds, paper napkins, half-eaten meals and other food scraps, and food-soiled paper products. Composting can occur on-site, and the organic matter is then used to fertilize flower beds and other landscaping. However, maintenance resources will be required. More and more municipalities and private sector entities are offering composting services.

Once a service or internal program is established, there are a number of issues to consider when implementing a composting program:

- Location and size of collection bins (a general rule is to place collection bins in food waste areas such as lunchrooms or office kitchen areas).
- Schedule for food waste collection from the building.
- Employee outreach and education.
- Procedures for addressing odors, pests, and overflow issues that may arise.

**Related Requirements and Standards:**

- EO 13514, Sec. 2 (e)(vi)

**Resources:**

U.S. Environmental Protection Agency, *Composting*,  
<http://www.epa.gov/wastes/consERVE/rrr/composting/>

U.S. Environmental Protection Agency, *Decision Maker's Guide to Solid Waste Management*,  
Vol. II, Chapter 7, *Composting*,  
<http://www.epa.gov/wastes/consERVE/rrr/composting/pubs/chapter7.pdf>

# **Appendix A**

Guiding Principles and Related Requirements Crosswalk



Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standards and Directives	Related Industry Standards
<b>Employ Integrated Design Principles</b>						
1.a. Integrated Design – Environmental Management System (EMS)	Executive Order (EO) 13423, Section 3(b) – Implement EMS within the agency at appropriate organizational levels.	EO 13514, Section 2(j) – Continue implementation of formal EMS. Ensure that EMS is used to achieve performance necessary to meet the sustainability goals of EO 13514.				International Organization for Standardization, Standard 14001:2004
1.b. Integrated Design – Assessment			Energy Independence and Security Act of 2007 (EISA), Section 432, Energy and Water Evaluations (the evaluation results may contribute to a sustainable building assessment).		Reclamation Manual, Temporary Reclamation Manual Release (TRMR), <i>Environmental Management System (EMS) Independent Conformance Audit and Declaration of Conformance Process</i> , TRMR-37 (the audit results may contribute to a sustainable building assessment).	
1.c. Integrated Design – Performance Goals		EO 13514, Section 2, Goals for Agencies				
1.d. Integrated Design – Building Management Plan				Leadership in Energy and Environmental Design for Existing Buildings: Operations and Maintenance (LEED EBOM) – Energy and Atmosphere (EA) Prerequisite 1: Energy Efficiency Management Practices – Planning, Documentation, and Opportunity Assessment (Building Operating Plan).		

<b>Guiding Principle</b>	<b>EO 13423</b>	<b>EO 13514</b>	<b>Existing Statute</b>	<b>LEED</b>	<b>Reclamation Standards and Directives</b>	<b>Related Industry Standards</b>
1.e. Integrated Design – Occupant Feedback				LEED EBOM, Indoor Environmental Quality (IEQ), Credit 2.1: Occupant Comfort – Occupant Survey		American National Standards Institute (ANSI)/American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Standard 55-2004, <i>Thermal Comfort Conditions for Human Occupancy</i>
1.f. Integrated Design – Green Teams	No related requirements.					
2.a-d. Commissioning			EISA, Section 432, Management of Energy and Water Efficiency in Federal Buildings	LEED EBOM, EA, Credit 2.1: Existing Building Commissioning – Investigation and Analysis		ASHRAE Guideline O-2005, <i>The Commissioning Process</i>

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directive	Related Industry Standards
<b>Protect and Conserve Water</b>						
1. Indoor Water – Water Use Reduction	Section 2(i) – Reduce water consumption intensity 2 percent annually through fiscal year (FY) 2015 or 16-percent total reduction by the end of FY 2015 (baseline FY 2007).	Section 2(d)(i) – Reduce 2 percent annually potable water consumption intensity through FY 2020 or 26 percent by the end of FY 2020 (baseline FY 2007 water consumption).		LEED EBOM, Water Efficiency (WE) Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency  LEED EBOM, WE Credit 2: Additional Indoor Plumbing Fixture and Fitting Efficiency		International Association of Plumbing and Mechanical Officials (IAPMO), Publication IAPMO/ANSI UPC 1-2006, Uniform Plumbing Codes, Section 402.0, <i>Water Conserving Fixtures and Fittings</i> , <a href="http://www.iapmo.org">http://www.iapmo.org</a>  International Code Council, International Plumbing Codes 2006, Section 604, <i>Design of Building Water Distribution System</i> , <a href="http://www.iccsafe.org">http://www.iccsafe.org</a>
2. Outdoor Water – Water Use Reduction		EO 13514 Section 2(d)(i) – Reduce industrial, landscaping, and agricultural water consumption by 2 percent annually or 20 percent by the end of FY 2020 (baseline FY 2010 industrial, landscaping, and agricultural consumption).		LEED EBOM, WE Credit 3: Water Efficient Landscaping		

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directive	Related Industry Standards
3.a. Measurement and Verification – Storm Water Runoff		EO 13514, Section 2(d)(iv) – Achieve the U.S. Environmental Protection Agency’s (EPA) stormwater management objectives.	EISA, Section 438 – For Federal properties over 5,000 square feet, maintain or restore the property’s predevelopment hydrology as to temperature, rate, volume, and duration of flow.	LEED for New Construction, Sustainable Sites (SS) Credit 6.1: Quantity Control, and 6.2: Quality Control (for redevelopment)		
3.b. Measurement and Verification – Water Meters				LEED EBOM, WE Credit 1: Water Performance Measurement		
4. Process Water			Energy Policy Act (EPA) of 2005, 42 United States Code (U.S.C.) 6834(a)(3)(A)(ii) – If water is used to achieve energy efficiency, water conservation technologies shall be applied to the extent that the technologies are lifecycle cost effective.	LEED EBOM, WE Credit 4.1-4.2: Cooling Tower Water Management		
5.a. Water Efficient Products – WaterSense® Products	<i>Instructions for Implementing EO 13423: Strengthening Federal Environmental, Energy, and Transportation Management</i> (Implementing Instructions), Section VI.A. (8) – Where applicable, agencies should purchase WaterSense labeled products.	EO 13514, Section 2(d)(i) and 2(h) – Advance sustainable acquisitions to ensure that 95 percent of new contract actions... for products and services...are water efficient.	Federal Acquisition Regulations (FAR), Subpart 23.202(b) – Water-Efficient Products	LEED EBOM, WE Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency		

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directive	Related Industry Standards
5.b. Water Efficient Products – WaterSense Irrigation Contractors	<i>Implementing Instructions, Section VI.A. (8) – Where applicable, agencies should ...choose irrigation contractors who are certified through a WaterSense labeled program.</i>					



Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
<b>Optimize Energy Performance</b>						
1.a. Energy Efficiency – Performance	EO 13423, Section 2(a) – Reduce building energy intensity 3 percent annually through FY 2015, or 30-percent total reduction by FY 2015 (baseline FY 2003).	EO 13514, Section 2(a)(i) – Reduce energy intensity in buildings to achieve greenhouse gas reductions.	EISA, Section 431, Energy Management Requirements – Reduce building energy intensity 3 percent annually through 2015, or 30 percent total reduction by 2015.	LEED, EA Credit 1: Optimize Energy Efficiency Performance		ASHRAE 90.1– 2007, <i>Energy Standard for Buildings Except Low-Rise Residential Buildings</i>
1.b. Energy Efficiency – ENERGY STAR® and Federal Energy Management Program (FEMP) Products	EO 13423, Section 2(d) – Purchase products that are: <ul style="list-style-type: none"> <li>• Recycled</li> <li>• Biopreferred</li> <li>• FEMP designated</li> <li>• Electronic Product Environmental Assessment Tool EPEAT™</li> <li>• WaterSense (and other water efficient)</li> </ul>	EO 13514, Section (h)(i) – Ensure 95 percent of new contract actions for products and services are: <ul style="list-style-type: none"> <li>• Energy efficient</li> <li>• Water efficient</li> <li>• Biobased content</li> <li>• Environmentally preferable</li> <li>• Recycled content</li> <li>• Nontoxic or less toxic than alternatives</li> </ul>	EPA Act 2005, Section 104, and 10 Code of Federal Regulations (CFR) Part 436: Federal Procurement of Energy-Efficient Products – Requires Federal agencies to incorporate energy efficiency criteria consistent with ENERGY STAR and FEMP-designated products for all procurements involving energy-consuming products and services. <p>EISA, Section 525, Federal Procurement of Energy Efficient Products – Requires procurement to focus on ENERGY STAR and FEMP-designated products.</p>	LEED EBOM, Materials and Resources (MR) Prerequisite 1: Sustainable Purchasing	Reclamation Acquisitions Regulations (RAR), Section WBR 1423.404, Affirmative Procurement Programs, Section (a)(2)(i)(J)	

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
2. On-Site Renewable Energy – Implementation	EO 13423, Section 2(b) – Ensure that 50 percent of statutorily required renewable energy comes from “new” (as of 1999) sources.	EO 13514, Section 2(a)(i) – Increase use of renewable energy.	EPAAct 2005, Section 205, Use of photovoltaic energy in public buildings  EISA, Section 523, Requires 30 percent of the hot water demand in new Federal buildings (and major renovations) to be met with solar hot water equipment, provided it is lifecycle cost effective (this will apply only if there is a major renovation).	LEED EBOM, EA Credit 4: On-site and Off-site Renewable Energy		
3.a. Measurement and Verification – Electricity Meters			EPAAct 2005, Sec. 103, Energy use measurement and accountability.	LEED EBOM, EA Credit 3.2: Performance Measurement – System-Level Metering		
3.b. Measurement and Verification – Natural Gas and Steam Meters			EISA Section 432, Management of energy and water efficiency in Federal buildings.	LEED EBOM, EA Credit 3.2: Performance Measurement – System-Level Metering		
4. Benchmarking			EISA, Section 432, Management of Energy and Water efficiency in Federal Buildings – Benchmarking of Federal Facilities	LEED EBOM, EA Credit 1: Optimize Energy Efficiency Performance		

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
<b>Reduce Environmental Impact of Materials</b>						
1.a. Recycled Content – EPA Designated	<p>EO Section 13423, Section 2(d) – Purchase products that are:</p> <ul style="list-style-type: none"> <li>• <b>Recycled</b></li> <li>• Biopreferred</li> <li>• FEMP designated</li> <li>• EPEAT</li> <li>• WaterSense (and other water efficient products).</li> </ul>	<p>EO 13514, Section 2(h)(i) – Ensure 95 percent of new contract actions for products and services are:</p> <ul style="list-style-type: none"> <li>• Energy efficient</li> <li>• Water efficient</li> <li>• Biobased content</li> <li>• Environmentally preferable</li> <li>• <b>Recycled content</b></li> <li>• Nontoxic or less toxic than alternatives</li> </ul>	<p>Resource Conservation and Recovery Act, Section 6002 – Requires agencies to establish an affirmative procurement program for maximizing its purchases of EPA-designated items.</p> <p>FAR Subpart 23.103 (a) – Sustainable Acquisitions Policy: Federal agencies shall advance sustainable acquisition by ensuring that 95 percent of new contract actions for the supply of products and for the acquisition of services (including construction) require that the products are:</p> <ol style="list-style-type: none"> <li>(1) Energy efficient (ENERGY STAR or FEMP designated);</li> <li>(2) Water efficient;</li> <li>(3) Biobased;</li> <li>(4) Environmentally preferable (e.g., EPEAT registered, or nontoxic or less toxic alternatives);</li> <li>(5) Non-ozone depleting; or</li> </ol>	LEED EBOM, MR Prerequisite 1: Sustainable Purchasing Policy	RAR Subpart WBR 1423.4: Use of Recovered Materials and Biobased Products	

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
			<p>(6) <b>Made with recovered materials</b></p> <p>FAR Subpart 23.4 – Use of Recovered Materials and Biobased Products</p>			
1.b. Recycled Content (building modification, renovation or repair)	EO 13423, Section 2(d). (See Materials 1.a. above.)	EO 13514, Section 2(h)(i). (See Materials 1.a. above.)	FAR Subpart 23.103 (a) – Sustainable Acquisitions Policy (See Materials 1.a. above.)	LEED EBOM, MR Credit 3: Sustainable Purchasing – Facility Alterations and Additions	RAR Subpart WBR 1423.4: Use of Recovered Materials and Biobased Products	
2.a. Biobased Content – U.S. Department of Agriculture Designated	<p>EO 13423, Section 2(d) – Purchase products that are:</p> <ul style="list-style-type: none"> <li>• Recycled</li> <li>• <b>Biopreferred</b></li> <li>• FEMP designated</li> <li>• EPEAT</li> <li>• WaterSense (and other water efficient products).</li> </ul>	<p>EO 13514, Section 2(h)(i) – Ensure 95 percent of new contract actions for products and services are:</p> <ul style="list-style-type: none"> <li>• Energy efficient</li> <li>• Water efficient</li> <li>• <b>Biobased content</b></li> <li>• Environmentally preferable</li> <li>• Recycled content</li> <li>• Nontoxic or less toxic than alternatives</li> </ul>	<p>Farm Security and Rural Investment Act of 2002, Section 943 (created the BioPreferred program). Food, Conservation, and Energy Act of 2008, Section 9002 (expanded the Biopreferred program).</p> <p>FAR Subpart 23.103 (a) – Sustainable Acquisitions Policy: Federal agencies shall advance sustainable acquisition by ensuring that 95 percent of new contract actions for the supply of products and for the acquisition of services (including construction) require that the products are:</p> <p>(1) Energy efficient (ENERGY STAR or FEMP designated);</p> <p>(2) Water efficient;</p> <p>(3) <b>Biobased;</b></p>	LEED EBOM, MR Prerequisite 1: Sustainable Purchasing Policy	RAR Subpart WBR 1423.4: Use of Recovered Materials and Biobased Products	

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
			(4) Environmentally preferable (e.g., EPEAT registered, or nontoxic or less toxic alternatives);  (5) Non-ozone depleting; or  (6) Made with recovered materials			
2.b. Biobased Content – Rapidly Renewable	EO 13423, Section 2(d). (See Materials 2.a. above.)	EO 13514, Section 2(h)(i). (See Materials 2.a. above.)	FAR Subpart 23.103 (a) – Sustainable Acquisitions Policy (See Materials 1.a. above.)	(See Materials 2.a. above.)		
2.c. Biobased Content – Certified Wood				LEED EBOM, MR Credit 3 – Sustainable Purchasing – Facility Alterations and Additions		
3. Environmentally Preferable Products	EO Section 13423, Section 2(d) – Purchase products that are: <ul style="list-style-type: none"> <li>• Recycled</li> <li>• BiopREFERRED</li> <li>• FEMP designated</li> <li>• <b>EPEAT</b></li> <li>• WaterSense (and other water efficient)</li> </ul>	EO 13514, Section 2(h)(i) – Ensure 95 percent of new contract actions for products and services are: <ul style="list-style-type: none"> <li>• Energy efficient</li> <li>• Water efficient</li> <li>• Biobased content</li> <li>• <b>Environmentally preferable</b></li> <li>• Recycled content</li> <li>• <b>Nontoxic or less toxic than alternatives.</b></li> </ul>	FAR Subpart 23.103 (a) – Sustainable Acquisitions Policy: Federal agencies shall advance sustainable acquisition by ensuring that 95 percent of new contract actions for the supply of products and for the acquisition of services (including construction) require that the products are: <ul style="list-style-type: none"> <li>(1) Energy efficient (ENERGY STAR or FEMP designated);</li> </ul>	LEED EBOM, MR Prerequisite 1: Sustainable Purchasing Policy	RAR Subpart WBR 1423.404(a)(2)(i): Affirmative Procurement Programs – Environmentally Preferable	

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
			(2) Water efficient; (3) Biobased; (4) <b>Environmentally preferable (e.g., EPEAT registered, or nontoxic or less toxic alternatives);</b> (5) Non-ozone depleting; or (6) Made with recovered materials			
4. Waste and Materials Management – Recycling	EO 13423, Section 2(e) – Increase diversion of solid waste as appropriate.	EO 13514, Section 2(e)(ii) – Divert 50 percent of nonhazardous solid waste from disposal by the end of FY 2015.  Section 2(e)(iii) – Divert 50 percent of construction and demolition materials and debris from disposal by the end of FY 2015.		LEED EBOM, MR Prerequisite 2: Solid Waste Management Policy  LEED EBOM, MR Credit 7: Solid Waste Management – Ongoing Consumables  LEED EBOM, MR Credit 8: Solid Waste Management – Durable Goods  LEED EBOM, MR Credit 9: Solid Waste Management – Facility Alterations and Additions		

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
5. Ozone Depleting Compounds			<p>Clean Air Act 1990, Sections 601-607.</p> <p>40 CFR Parts 9 and 82, Protection of Stratospheric Ozone</p> <p>FAR Subpart 23.103 (a) – Sustainable Acquisitions Policy: Federal agencies shall advance sustainable acquisition by ensuring that 95 percent of new contract actions for the supply of products and for the acquisition of services (including construction) require that the products are:</p> <ul style="list-style-type: none"> <li>(1) Energy efficient (ENERGY STAR or FEMP designated);</li> <li>(2) Water efficient;</li> <li>(3) Biobased;</li> <li>(4) Environmentally preferable (e.g., EPEAT registered, or nontoxic or less toxic alternatives);</li> <li>(5) <b>Non-ozone depleting</b>; or</li> <li>(6) Made with recovered materials</li> </ul>	<p>LEED EBOM, EA Prerequisite 3: Fundamental Refrigerant Management</p> <p>LEED EBOM, EA Credit 4: Enhanced Refrigerant Management</p>	<p>RAR Subpart WBR 1423.404(a)(2)(i)(M): Affirmative Procurement Programs – Non-Ozone Depleting Substances</p>	



Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
<b>Enhance Indoor Environmental Quality</b>						
1.a. Ventilation and Thermal Comfort – Thermal Conditions				LEED EBOM, IEQ Credit 2.3: Occupant comfort – Thermal Comfort Monitoring		ASHRAE 55, Thermal Environmental Conditions for Human Occupancy
1.b. Ventilation and Thermal Comfort – Ventilation				LEED EBOM, IEQ Prerequisite 1: Minimum Indoor Air Quality Performance		ASHRAE 62.1–2007, Ventilation Rate Procedure
2.a. Moisture Control – Control Strategies	No related requirements.					
2.b. Moisture Control – Dew Point Analysis				LEED EBOM, IEQ Credit 1.1: Indoor Air Quality Best Management Practices – Indoor Air Quality Management		
3.a. Daylighting – Automatic Controls	No related requirements.					
3.b. Daylighting – Daylighting Factor/ Lighting Controls			LEED EBOM, IEQ Credit 2.4: Daylight and View  LEED EBOM, IEQ Credit 2.2: Controllability of Systems – Lighting			

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
4. Low-Emitting Materials			<p>LEED EBOM, IEQ Prerequisite 3: Green Cleaning Policy (to reduce human exposure to potentially hazardous chemicals)</p> <p>LEED EBOM, IEQ Credit 3.3: Purchase of Sustainable Cleaning Products and Materials</p>			
5.a. Pest Management – Techniques				LEED EBOM, IEQ Credit 3.6: Green Cleaning – Indoor Integrated Pest Management		
5.a. Pest Management – Pesticides			Federal Insecticide, Fungicide, and Rodenticide Act of 1996			
6.a. Environmental Tobacco Smoke Control – Indoor			<p>EO 13058, Protecting Federal Employees and the Public From Exposure to Tobacco Smoke in the Federal Workplace</p> <p>RAR, Subpart WBR 1423.80: Protecting Federal Employees and the Public From Exposure to Tobacco Smoke in the Federal Workplace</p>	LEED EBOM IEQ Prerequisite 2: Environmental Tobacco Smoke Control		

Guiding Principle	EO 13423	EO 13514	Existing Statute	LEED	Reclamation Standard and Directives	Related Industry Standards
<b>Reclamation-Specific Requirements – Sustainable Sites</b>						
1.a. Heat Island Effect – Non-roof				LEED EBOM, SS Credit 7.1: Heat Island Reduction – Non-roof		
1.b. Heat Island Effect – Roof				LEED EBOM, SS Credit 7.2: Heat Island Reduction – Roof		
2. Light Pollution				LEED EBOM, SS Credit 8: Light Pollution Reduction		
3. Composting				EO 13514, Section 2 (e)(vi)		



# **Appendix B**

Building Management Plan Framework



The following is a list of the building activities and operations that, at a minimum, must be addressed in a Building Management Plan (BMP):

## **1. Building Exterior and Hardscape Maintenance**

Procedures should be established for equipment maintenance, snow and ice removal, cleaning of the building exterior, paints and sealants used on the exterior of the building, and cleaning of sidewalks, pavements, and other hardscapes that ensures minimal impact on the environment and surrounding landscape. For any reflective materials with a minimum Solar Reflectance Index of 29, include cleaning the material a minimum of every 2 years to maintain the solar reflectivity properties of the material.

## **2. Landscaping**

The BMP should include procedures for environmentally sound management of landscapes that reduces water, chemical fertilizer, and pesticide use; achieves erosion and sedimentation control; and diverts landscape waste from the waste stream. To protect and restore habitat, include procedures for future site modifications based on Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings requirements, such as limiting site disturbance during construction, maintaining existing areas of native and adaptive vegetation, preserving existing natural site elements, using only native and/or adaptive vegetation, and restoring previously developed areas of the site when possible. To maximize open space, include procedures for future site footprint to maintain the existing ratio of open space to building footprint.

## **3. Pest Management**

The BMP includes integrated pest management (IPM) techniques and procedures. These procedures should include environmental best management practices to significantly reduce harmful pesticides, air pollution, and chemical runoff. Refer to Reclamation's *Integrated Pest Management Manual for Effective Management on Reclamation Facilities* (November 2008) for detailed guidance related to specific pest and IPM techniques.

## **4. Building Operations**

The BMP provides details on how the building is to be operated and maintained, and it includes a detailed systems inventory, narrative, sequence of operations, and preventive maintenance plan. The plan identifies all spaces within the building, space uses, occupancy types, and condition required in each space.

The plan includes, at a minimum, an occupancy schedule, equipment run-time schedule, design set points for all heating, ventilating, and air-conditioning equipment, and design lighting levels throughout the building. The BMP should include systems inventory and narrative that briefly describes the mechanical and electrical systems and equipment in the building, including all the systems used to meet the operating conditions such as heating, cooling, ventilation, lighting, and controls systems. The narrative should describe or refer to a preventive maintenance plan for equipment and a preventive maintenance schedule.

## **5. Solid Waste Management**

The BMP should include procedures for the collection, sorting, diversion, recycling, composting (where feasible), and disposal of ongoing consumables (paper, cardboard, glass, plastic, metals, etc.), durable goods (electronic equipment, furniture, etc.), and building materials associated with facility alterations for the building.

## **6. Moisture Control**

To prevent building damage, minimize mold contamination, and reduce health risks related to moisture, the BMP should include moisture prevention strategies such as regularly scheduled maintenance of the roof drainage and foundation system, periodic inspections of building materials, and implementation of appropriate ventilation and humidity controls.

# **Appendix C**

ASHRAE Standard 55 Compliance Guidance



## **1. Requirement**

Determine compliance with American Society of Heating, Refrigerating, and Air-Conditioning Engineers Standard 55-2004, *Thermal Environmental Conditions for Human Occupancy* (ASHRAE 55).

## **2. Interpretation**

ASHRAE 55 is recognized more as a design and comprehensive evaluation standard than as an assessment tool that can be accomplished on a site visit and post site visit analysis. To ensure that an assessment of compliance is kept to a reasonable amount of time, while still maintaining the standard's intent, the Bureau of Reclamation recommends the following procedures for assessment compliance. It is understood that an engineering professional familiar with this standard is required to evaluate compliance, and some engineering judgment will be necessary. An engineering professional with the following qualifications shall make the final determination of compliance:

- Professional Engineer or Certified Energy Manager.
- 10 years minimum of relevant experience.

There are two methods for determining acceptable thermal conditions in occupied spaces as outlined by ASHRAE 55. One method is based on a typical indoor environment with set conditions. The other method assesses thermal conditions in naturally conditioned spaces. Naturally conditioned spaces are those spaces controlled by occupants through the opening and closing of windows.

## **3. Compliance Determination**

Compliance shall be determined using an analysis of environmental variables (as opposed to a survey of occupants).

Signs of possible occupant thermal discomfort shall be observed and recorded, such as:

- Oscillating table fans, window fans, or other personal fans.
- Personal space heaters.
- Open windows (unless it is an occupant-controlled, naturally conditioned space).
- Window or through-the-wall style room air-conditioners.

- Covered or otherwise occupant-modified supply air diffusers.
- Altered or broken thermostats.

Measurements are required in spaces that have the highest concentration of the "signs of possible occupant thermal discomfort" listed above. In addition, data shall be collected from a representative sample set of occupied spaces in the building (e.g., space on south side of building, space on north side of building, etc.). Several factors may influence an auditor's decision on sampling locations and amount of sampling. For example, if many of the spaces measured are barely meeting the temperature and humidity conditions, then more measurements may be needed. Similarly, if there are a significant number of personal comfort devices (e.g., fans, heaters, and window air-conditioning units) or damaged and/or occupant-altered heating, ventilating, and air-conditioning equipment (e.g., diffusers and thermostats), the auditor shall consider additional measurements in these areas.

Measurements shall include all of the following for an appropriate duration of time, sampling quantity, location, tools, and techniques:

- Space temperature
- Humidity
- Air speed
- Draft

The following requirements apply to measurements:

- Measurements shall be taken during occupied hours.
- Measurements shall be taken during either heating or cooling seasons. Measurements do not need to be taken during both seasons.
- Measurements can be taken during any weather conditions, although weather conditions that promote heating or cooling are preferred.
- The minimum number of locations within the building for taking measurements shall be conducted according to building size as stipulated in the following table:

Building Size (ft <sup>2</sup> )	Minimum No. of Building Locations Measured
≤5,000	2
>5,000 to ≤10,000	3
>10,000 to ≤25,000	4
>25,000 to ≤100,000	+2 per 25,000 ft <sup>2</sup>
>100,000 to ≤500,000	+1 per 25,000 ft <sup>2</sup>
>500,000	+1 per 50,000 ft <sup>2</sup>

Note: ft<sup>2</sup> = square feet

- Default values for metabolic rate shall be used.
- The following value shall be used for the insulating value of clothing (clo)<sup>15</sup>:
  - Heating season: 1.0 clo
  - Cooling season: 0.5 clo
- If the building is significantly affected by solar gain in certain areas of the building, an attempt shall be made to capture these effects in the documentation.
- Operations and status of mechanical equipment do not need to be monitored concurrently with the other measurements taken to determine compliance. System operational status during time of measurement shall be noted.

The following exemptions apply:

- Testing at 50 percent of the design load is not required.
- Time series measurements are not required.

The assessment of thermal comfort does not depend on one occupied space not meeting the temperature and humidity requirements. Based on all measurements, observations, and appropriate references to the charts and equations, as listed in ASHRAE 55, the auditor shall provide a professional opinion as to whether the building as a whole is a suitable work environment for those subject to the respective working conditions, thus passing or failing to meet ASHRAE 55.

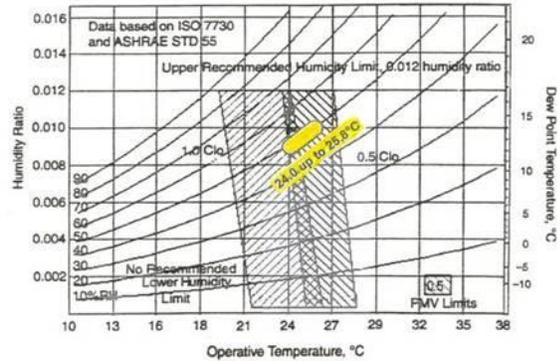
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<sup>15</sup> CLO is a numerical value describing thermal insulation provided by clothing, ranging from 0.5 to 1.5, and is referenced by ASHRAE 55-2004.

## 4. Compliance Documentation

Compliance documentation for each building shall include the following:

- Data recorded in a table with a listing of each room and time of measurement.
- A drawing/sketch showing the room locations.
- A chart (see example) corrected for air speed and draft. The chart shall include all measurements taken in the building.
- A table that includes location and pictures of "signs of possible occupant thermal discomfort".



Example: Psychrometric chart.

- Calculations used to determine compliance.
- The professional opinion (considering all data collected and reported) as to whether the building is likely to be, or not be, in compliance with ASHRAE 55.

## 5. References

U.S. Environmental Protection Agency, *2010 Licensed Professional's Guide to the ENERGY STAR Label for Commercial Buildings* (March 2010).

# **Appendix D**

ASHRAE Standard 62.1 Compliance Guidance



## 1. Requirement

Determine compliance with American Society of Heating, Refrigerating, and Air-Conditioning Engineers Standard 62.1-2007, *Ventilation for Acceptable Indoor Air Quality* (ASHRAE 62.1).

## 2. Interpretation

ASHRAE 62.1 is recognized more as a design standard than an assessment tool. To ensure an assessment of compliance is kept to a reasonable amount of time, while still maintaining the standard's intent, the Bureau of Reclamation recommends the following procedures for "naturally ventilated spaces" or "mechanically ventilated spaces." It is understood that an engineering professional familiar with this standard is required to evaluate compliance, and some engineering judgment will be necessary. An engineering professional with the following qualifications shall make the final determination of compliance:

- Professional Engineer or Certified Energy Manager.
- 10 years minimum of relevant experience.

## 3. Requirements

- For mechanically ventilated spaces, ASHRAE 62.1 Ventilation Rate Procedure shall be used unless adequate justification is provided for using the air quality measurement method. For the naturally ventilated spaces, ASHRAE 62.1, Section 5.1, Natural Ventilation shall be used.
- The presence of the following items shall be verified:
  - Operations and maintenance procedures.
  - Bird screens, where appropriate, based on experience.
  - Dehumidification equipment, where appropriate, based on experience.
  - Air filters, where appropriate, based on experience.
  - CO<sub>2</sub> sensors for systems with demand-controlled ventilation.
- Adequate separation distance between exhaust and air intakes shall be verified.

#### **4. Exclusions**

- Evaluation of exhaust air flow rates is not required, except for special occupancy spaces that have dedicated exhaust systems (e.g., restrooms, copy rooms).
- All additional items included in ASHRAE 62.1 outside of the Ventilation Rate Procedure and items shown in this requirements list shall not be verified.

#### **5. Assumptions**

- All systems are in compliance with ASHRAE 62.1, Section 6.2.1, which says that outdoor air must be properly treated and filtered and may depend on the regional location of the building.
- All spaces are nonsmoking areas.
- Systems using dynamic resets of the minimum outdoor air during occupied periods are in compliance. This includes systems using demand-controlled ventilation through CO<sub>2</sub> concentration monitoring or other methods. These system types are unlikely to be encountered.

#### **6. Case 1: Naturally Ventilated Spaces**

For naturally ventilated spaces, airflow ventilation measurements shall not be required. Instead, the auditor shall determine if operable wall and roof openings are sized appropriately and within access to occupants in such a manner that satisfies ASHRAE 62.1, Section 5.1.

#### **7. Case 2: Mechanically Ventilated Spaces**

For mechanically ventilated spaces, one of the following methods shall be used:

##### **a. Method 1: Sufficient Drawings and/or Design Calculations Exist**

1. Review drawings and/or design calculations to determine compliance.

2. On-site: Ensure that major system components (e.g., air intake dampers) are installed and operating as designed. Confirm designed operation of ventilation systems in the occupied and unoccupied modes.
3. Use the design documentation and the Ventilation Rate Procedure to determine if the minimum outdoor airflow supplied to the building is sufficient. Use default values listed in ASHRAE 62.1 for occupant density and combined outdoor air rate.

**b. Method 2: Sufficient Drawings and/or Design Calculations Do Not Exist**

On-site, perform direct measurements at the following locations:

1. **Single-Zone Recirculating Systems.** Determine the outside airflow. For each outside air intake, force the system to provide air at minimum airflow and take direct measurements of outside air. This can be performed by either taking a single measurement using a balometer (flow hood) or multipoint grid pattern measurements using an anemometer.
2. **Multiple-Zone Recirculating Systems.** Identify and sample the critical zone(s) served by the air handler. Most often, these are zones with the most hot and cold calls (which means they are not receiving enough supply air to meet comfort needs) or areas that may have large population fluctuations or densities (e.g., conference rooms, small offices where meetings may be held, break rooms).
  - a) Measure outside air temperature, return air temperature, and mixed air temperature when outside air dampers are at minimum.
  - b) Use these temperatures to determine outside air percentage at minimum outside air flow.
  - c) Determine the critical zone primary airflow using direct measurement.
  - d) Multiply the outside air percentage times the zone airflow to determine flow of outside air that reaches the space.

3. **Variable Air Volume Systems.** The outdoor airflow (and zone primary airflow for multiple-zone systems) shall be determined during the minimum expected primary airflow conditions (e.g., minimum fan speed).

Determine the design minimum outdoor airflow required in the breathing zone using the Ventilation Rate Procedure. Compare the design minimum outdoor airflow to the measured outdoor airflow (and primary airflow rate, if applicable) to determine compliance.

## **8. Compliance Documentation**

Compliance documentation for each building shall include the following:

- Data recorded in a table with a listing of each location and time of measurement.
- A drawing/sketch showing the room locations.
- A table that includes location and pictures of items preventing compliance (e.g., missing air filter).
- Calculations used to determine compliance.
- The professional opinion (considering all data collected and reported) as to whether the building is likely to be, or not be, in compliance with ASHRAE 62.1.

## **9. References**

U.S. Environmental Protection Agency. March 2011. *2010 Licensed Professional's Guide to the ENERGY STAR Label for Commercial Buildings.*