SUSTAINABILITY TRACK
Session 1

GovEnergy
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GSA

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Meeting Federal Sustainability Goals: A DOE National Lab Experience

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Overview

- Summary of Requirements
- Guiding Principles
- DOE Tool
- PNNL's look at the 15% goal
  - Building inventory analysis
  - Building status
  - Strategies
  - Example building

Summary of Federal Requirement

- Executive Order 13423 requires
  - New construction and major renovation of Federal buildings comply with the Guiding Principles, and
  - At least 15 percent of the existing Federal capital asset building inventory of the agency as of the end of Fiscal Year 2015 incorporates the sustainable practices in the Guiding Principles.

Summary of DOE Requirements

- Department of Energy (DOE) Transformational Energy Action Management (TEAM) Initiative stated
  - *All* new DOE-owned buildings will incorporate the Guiding Principles to the extent practical.
  - As of October 1, 2008, all new buildings and major building renovations still in the design stage, with a value exceeding $5 million, must implement the Guiding Principles through certification to LEED Gold standard.
  - DOE Program Offices owning or leasing real property must develop and implement a plan to ensure that 15 percent of their existing buildings are in compliance with the Guiding Principles.
  - All procurement specifications and selection criteria for acquiring new leased space are to include a preference for LEED Gold, and all lease extensions and renegotiations are to include provisions incorporating the Guiding Principles to the greatest extent practicable.

Summary of DOE Requirements, *continued*

- DOE Order 430.1B, *Real Property Asset Management*
  - Site level strategies to meet the sustainability goals of E.O. 13423 will be reported within the site Ten Year Site Plans.
- DOE Order 413.3A, *Program and Project Management for the Acquisition of Capital Assets*
  - Requires that the Federal project director explicitly consider and incorporate sustainable design principles into each phase of the building design and construction process.
- DOE Order 430.2B, *Departmental Energy, Renewable Energy, and Transportation*
  - Requires all new buildings and major buildings renovations at CD-1 or lower with a value exceeding $5 million implement the Guiding Principles and attain LEED Gold certification.
  - Requires all procurement specifications and selection criteria for acquiring new leased space, including build-to-suit lease solicitations, are to include a preference for buildings certified as LEED Gold.

Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings

- Employ Integrated Design Principles
  - Integrated Design
  - Commissioning
- Optimize Energy Performance
  - Energy Efficiency
  - Measurement and Verification
- Protect and Conserve Water
  - Indoor Water
  - Outdoor Water

Guiding Principles, continued

- Enhance Indoor Environmental Quality
  - Ventilation and Thermal Comfort
  - Moisture Control
  - Daylighting
  - Low-Emitting Materials
  - Protect Indoor Air Quality during Construction
- Reduce Environmental Impact of Materials
  - Recycled Content
  - Biobased Content
  - Construction Waste
  - Ozone Depleting Compounds

DOE Assessment Tool (Excel-based model)

HIGH PERFORMANCE and SUSTAINABLE BUILDINGS

U.S. DEPARTMENT OF ENERGY

NREL's Science & Technology Facility

Sandia's MESA Microsystems Fabrication

Cover | MISSION | Table of Contents | Instructions New Construction | New Construction Checklist | Instructions Existing Buildings

DOE Assessment Tool

High Performance and Sustainable Buildings (HPSB)

Table of Contents

1 Instructions for New Construction
2 HPSB Checklist for New Construction
3 Instructions for Existing Buildings
4 HPSB Checklist for Existing Buildings
6 Integrated Design
7 Commissioning
8 Energy Efficiency
9 Measurement and Verification
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11 Outdoor Water
12 Ventilation Thermal Comfort
13 Moisture Control
14 Daylighting
15 Low-Emitting Materials
16 Protect Indoor Air Quality During Construction
17 Recycled Content
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19 Construction Waste
20 Ozone Depleting Compounds
21 Guiding Principles Compliance Summary
22 Frequently Asked Questions
23 DOE List of LEED APs

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High Performance and Sustainable Buildings Guiding Principles
Checklist for New Construction

Building Name:

Address:

These fields will populate as corresponding guiding principles and LEED credits are marked		
	% HPSB Guiding Principles Achieved	100%
	Total LEED Credits (Yes column)	27

Assessment

Initial						Final
LEED			**Sustainable Sites**		14 Points	HPSB
YES	Maybe	No				
Y			Prereq 1	Construction Activity Pollution Prevention	LEED Rqd	☑
1			Credit 1	Site Selection	1	☑
			Credit 2	Development Density & Community Connectivity	1	
			Credit 3	Brownfield Redevelopment	1	
			Credit 4.1	Alternative Transportation, Public Transportation Access	1	
			Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1	
			Credit 4.3	Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles	1	
			Credit 4.4	Alternative Transportation, Parking Capacity	1	
			Credit 5.1	Site Development, Protect or Restore Habitat	1	
			Credit 5.2	Site Development, Maximize Open Space	1	
1			Credit 6.1	Stormwater Design, Quantity Control	1	☑
1			Credit 6.2	Stormwater Design, Quality Control	1	☑
			Credit 7.1	Heat Island Effect, Non-Roof	1	
			Credit 7.2	Heat Island Effect, Roof	1	
			Credit 8	Light Pollution Reduction	1	
3	0	0	**Subtotal**			
LEED			**Water Efficiency**		5 Points	HPSB
YES	Maybe	No				
1			Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1	☑
			Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1	
			Credit 2	Innovative Wastewater Technologies	1	
1			Credit 3.1	Water Use Reduction, 20% Reduction	1	☑
			Credit 3.2	Water Use Reduction, 30% Reduction	1	
2	0	0	**Subtotal**			
LEED			**Energy & Atmosphere**		17 Points	HPSB
YES	Maybe	No				

Guiding Principles:
27 LEED® Credits
5 Prerequisites

DOE requires LEED® Gold as minimum

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Existing Buildings

Step 1: Utilize the Tab: *Existing Buildings Checklist* to take a quick inventory of where the building stands in terms of meeting overall sustainable building practices.

High Performance and Sustainable Buildings (HPSB)

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Cover | MISSION | Table of Contents | Instructions New Construction | New Construction Checklist | Instructions Existing Buildings

Existing Buildings Checklist

Guiding Principles have been matched with LEED Credits

Allows for Pre - and Final Assessment

High Performance and Sustainable Buildings Guiding Principles

Checklist for Existing Buildings

Building Name:

Address:

This field will populate as guiding principles are completed in the compliance tabs	% HPSB Guiding Principles Achieved*	0%
	Total LEED Credits Achieved (Yes column)	24

Assessment

Initial

LEED			Sustainable Sites		12 Points
YES	Maybe	No			
			SSc1	LEED Certified Design and Construction	1
			SSc2	Building Exterior and Hardscape Management Plan	1
			SSc3	Integrated Pest Management, Erosion Control and Landscape Management Plan	1
			SSc4.1	Alternative Commuting Transportation - 10%	1
0			SSc4.2	Alternative Commuting Transportation - 25%	1
			SSc4.3	Alternative Commuting Transportation - 50%	1
			SSc4.4	Alternative Commuting Transportation - 75% or greater	1
			SSc5.	Reduced Site Disturbance - Protect or Restore Open Spac	1
1			SSc6	Storm Water Management	1
			SSc7.1	Heat Island Reduction - Non-Roof	1
			SSc7.2	Heat Island Reduction Roof	1
			SSc8	Light Pollution Reduction	1
1	0	0	**Subtotal**		

LEED			Water Efficiency		10 Points
YES	Maybe	No			
			Prereq 1	Minimum Indoor Plumbing Fixture Efficiency	LEED Rqd
			WEc1.1	Water Performance Measurement - Whole Building Water Meter	1
			WEc1.2	Water Performance Measurement - Subsystem Metering	1
1			WEc2.1	Additional Indoor Plumbing Fixture Efficiency - 10%	1
1			WEc2.2	Additional Indoor Plumbing Fixture Efficiency - 20%	1
			WEc2.3	Additional Indoor Plumbing Fixture Efficiency - 30%	1
1			WEc3.1	Water Eff Landscape - Reduce Potable Water by 50%	1
			WEc3.3	Water Eff Landscape - Reduce Potable Water by 75%	1
			WEc3	Water Eff Landscape - Reduce Potable Water by 100%	1
			WEc4.1/4.2	Cooling Tower Water Management	2
3	0	0	**Subtotal**		

Step 2: For each HPSB Guiding Principle, document performance through the use of the individual tabs (integrated design, commissioning, energy efficiency, etc).

Guiding Principle II. Optimize Energy Performance: Energy Efficiency

High Performance Sustainable Buildings
Explanation of Principle and Required Documentation for Existing Buildings

HPSB Principle	How to Comply	Documents On File?	Related LEED Credit for U.S. Department of Energy
Intent: Demonstrate energy optimization performance. Establish a whole building performance target that takes into account the intended use, occupancy, operations, plug loads, other energy demands, and design to earn the ENERGY STAR targets for new construction and major renovation where applicable. For new construction, reduce the energy cost budget by 30 percent compared to the baseline building performance rating per the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., (ASHRAE) and the Illuminating Engineering Society of North America (IESNA) Standard 90.1-2004, Energy Standard for Buildings Except Low-Rise Residential. For major renovations, reduce the energy cost budget by 20 percent below pre-renovations 2003 baseline.	Document compliance with energy performance targets achieved through meter data, bills, energy usage modeling software, or data from Energy Service Performance Providers. Documentation and performance requirements are explained below. Or register with ENERGY STAR's Portfolio Manger and achieve a rating score of 75 or greater and print out the Statement of Energy Performance.	X	EAc1.1-15; Energy Optimization:

Documentation Options for ***Intent:***

Option A. Energy Usage Reduction
Reduce measured building energy use by 30% compared to measured building energy use in 2003, design (not including designated mission, non-building intensive use),

Option B. Energy Usage Reduction
Reduce energy use by 20% compared to the current ASHRAE 90.1 baseline building design (not including designated mission, non-building energy intensive usage).

Option C. Energy Star Rating
For buildings ratable by ENERGY STAR's Portfolio Manger tool, achieve an energy performance rating of at least **75**. If unable to document through Portfolio Manager benchmark use LABS21 database to demonstrate a 25% improvement above average.

****Confirmation****

Building ID:

Signed By: **Date:**

Title:

Related Mandates

The Energy Independence and Security Act of 2007 (EISA)
The Energy Policy Act of 2005 (EPACT)

Resources

http://www.wbdg.org/references/mou_ee.php
http://www.wbdg.org/pdfs/10cfr435.pdf
http://www.wbdg.org/ccb/REGS/doe435.pdf

Commissioning | **Energy Efficiency** | M&V | Indoor Water | Outdoor Water | Ventilation Thermal Comfort | Moisture Control | Daylight

Existing Buildings Checklist

Step 3:

The total percent of the HPSB Guiding Principles achieved is tabulated when the Compliance Tab for each GP is checked.

High Performance and Sustainable Buildings Guiding Principles

Checklist for Existing Buildings

Building Name:

Address:

This field will populate as guiding principles are completed in the compliance tabs

% HPSB Guiding Principles Achieved*	85%
Total LEED Credits Achieved (Yes column)	24

Assessment

Initial

LEED			Sustainable Sites		12 Points
YES	Maybe	No			
			SSc1	LEED Certified Design and Construction	1
			SSc2	Building Exterior and Hardscape Management Plan	1
			SSc3	Integrated Pest Management, Erosion Control and Landscape Management Plan	1
			SSc4.1	Alternative Commuting Transportation - 10%	1
0			SSc4.2	Alternative Commuting Transportation - 25%	1
			SSc4.3	Alternative Commuting Transportation - 50%	1
			SSc4.4	Alternative Commuting Transportation - 75% or greater	1
			SSc5.	Reduced Site Disturbance - Protect or Restore Open Spac	1
1			SSc6	Storm Water Management	1
			SSc7.1	Heat Island Reduction - Non-Roof	1
			SSc7.2	Heat Island Reduction Roof	1
			SSc8	Light Pollution Reduction	1
1	0	0	**Subtotal**		

LEED			Water Efficiency		10 Points
YES	Maybe	No			
			Prereq 1	Minimum Indoor Plumbing Fixture Efficiency	LEED Rqd
			WEc1.1	Water Performance Measurement - Whole Building Water Meter	1
			WEc1.2	Water Performance Measurement - Subsystem Metering	1
1			WEc2.1	Additional Indoor Plumbing Fixture Efficiency - 10%	1
1			WEc2.2	Additional Indoor Plumbing Fixture Efficiency - 20%	1
			WEc2.3	Additional Indoor Plumbing Fixture Efficiency - 30%	1
1			WEc3.1	Water Eff Landscape - Reduce Potable Water by 50%	1
			WEc3.3	Water Eff Landscape - Reduce Potable Water by 75%	1
			WEc3	Water Eff Landscape - Reduce Potable Water by 100%	1
			WEc4.1/4.2	Cooling Tower Water Management	2
3	0	0	**Subtotal**		

Guiding Principle Summary Table

Compliance Forms also tabulate a Guiding Principle Assessment Summary Table.

Provides area for comments/notes on meeting Guiding Principles.

High Performance Sustainable Buildings
Existing Buildings Assessment Verification - Summary Table

HPSB Principle	Action Required	% HPSB GPs Achieve	notes/comments
1. Employ Integrated Design Principles		0.0%	
Integrated design	LEED Accredited Professional·Inter-sustainable team		
Commissioning	Commissioning: Investigation & Analysis.		
	Commissioning: Implementation		
2. Optimize Energy Performance			
Energy Efficiency	Energy Optimization		
Measurement and Verification	Energy Star's Portfolio Manger or Labs 21, or equivalent		
	Building level utility meters		
	Data entered into High Performance database		
3. Protect and Conserve Water			
Indoor Water	Indoor Plumbing Fixture Efficiency, 20 %		
Outdoor Water	Water Efficient Landscaping, Reduce by 50%		
	Storm-water management		
4. Enhance Indoor Environmental Quality			
Ventilation and Thermal Comfort	Ashrae Standard 55 & 62.1		
Moisture Control	Moisture Control Strategy		
Daylighting	Lighting Control for 50% of building occupants		
	2% daylight factor in 75% of all spaces		
Low-Emitting Materials	Materials and products with		

Biobased Content / Construction Waste / Ozone Depleting Compounds / GP Compliar

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Projected Building Inventory[1]

2008 Inventory

- 96 total buildings
  - 2,015,000 gross square feet (ft^2)
- 29 DOE-owned buildings
  - 762,000 ft^2
  - 224,000 ft^2 is data center and high-end laboratory
- 39 Battelle-owned buildings
  - 407,000 ft^2
- 28 Leased buildings
  - 846,000 ft^2
- FIMS database: 1,566,374 ft^2
- Energy reporting: 1,191,000 ft^2
- Water reporting: 1,415,000 ft^2

2015 Projected Inventory

- All buildings: 2,181,000 ft^2
- 12 DOE-owned buildings: 794,000 ft^2
- Battelle-owned buildings: 407,000 ft^2
- Leased buildings: 980,000 ft^2

- Energy reporting: 1,287,000 ft^2
- Water reporting: 1,511,000 ft^2

Possible 15% Goal: 1.8 buildings or 119,100 to 327,150 ft^2

[1] Pacific Northwest National Laboratory FY2009 Laboratory Plan.

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Assessing Building Inventory

- STEP 1:
  - Identify applicable buildings for baseline
- STEP 2:
  - Identify buildings that may already incorporate the *Guiding Principles*
    - New radiological laboratory (3 buildings), LEED certification expected (201,000 ft^2)
    - Two new leased chemical and biological laboratory buildings, LEED certification expected (150,000 ft^2)
- STEP 3:
  - Identify which building(s) have greatest potential for meeting the *Guiding Principles*

Strategy

- Require LEED Gold for all new construction per the TEAM Initiative
- Review existing building inventory for buildings that have the potential to meet the *Guiding Principles*
  - DOE-owned provides access to ESPC funding
  - Large “office” type buildings would be simpler than laboratory space
  - Simple, non-chemistry and non-radiologically based laboratory buildings
  - Cooperative landlord for leased facilities
  - Buildings we are investing in to meet the Energy goals
  - Energy intensive laboratories with data centers and fume hoods – **IF** advances in technology allow for breakthrough in energy savings

Potential Buildings

- New Construction
  - Radiological laboratory, 201,000 ft^2
- Leased Buildings
  - Office, 85,000 ft^2
  - Office, 100,000 ft^2
  - Offices, 3 X 17,000 ft^2
  - Chemical and biological laboratory buildings, 150,000 ft^2
- DOE-Owned
  - Energy intensive laboratories

Existing Laboratory-Wide Strategies Supporting the *Guiding Principles* and DOE Requirements

- Environmentally Preferable Purchasing Program
  - Requires purchase of materials with recycled content as designated by EPA
  - Requires purchase of materials with bio-based content as designated by USDA
- Using ESPCs, new construction, and overhead funded projects to meet 30% energy use reduction goal
- Working with landlords to increase number of Energy Star rated leased facilities
- On-site, trained commissioning expertise
- Site-wide outdoor water use reduction practices
- 10+ LEED Accredited Professionals on-site
- Environmental Management System Core Team working across organizations to meet EO goals

Challenges to Meeting the *Guiding Principles*

- Removing water free urinals on campus
  - Maintenance challenges
  - Changing to ultra-low flow fixtures
- Larger, DOE-owned buildings are laboratory intensive and/or data centers
  - Testing innovative energy saving technologies
- Construction waste management strategies are new to our community

Example Building

- Leased Office Space, 85,000 ft^2
- Cooperative landlord
- Re-commissioning building to achieve Energy Star rating
- Upgrading indoor water fixtures
- Optimizing outdoor water use
- Open Plan, with daylight available to almost all regularly occupied spaces

LEED			Water Efficiency		10 Points
YES	Maybe	No			
			Prereq 1	Minimum Indoor Plumbing Fixture Efficiency	LEED Rqd
			WEc1.1	Water Performance Measurement - Whole Building Water Meter	1
			WEc1.2	Water Performance Measurement - Subsystem Metering	1
1			WEc2.1	Additional Indoor Plumbing Fixture Efficiency - 10%	1
	1		WEc2.2	Additional Indoor Plumbing Fixture Efficiency - 20%	1
			WEc2.3	Additional Indoor Plumbing Fixture Efficiency - 30%	1
	1		WEc3.1	Water Eff Landscape - Reduce Potable Water by 50%	1
			WEc3.3	Water Eff Landscape - Reduce Potable Water by 75%	1
			WEc3	Water Eff Landscape - Reduce Potable Water by 100%	1
			WEc4.1/4.2	Cooling Tower Water Management	2
1	**2**	**0**	**Subtotal**		

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Summary Guiding Principles Checklist

Guiding Principle III. Protect and Conserve Water: Indoor Water

High Performance Sustainable Buildings
Assessment Compliance Form

Guiding Principle	How to Comply	Documents On File?	Related LEED Credit for U.S. Department of Energy
Intent: Employ strategies that in aggregate use a minimum of 20 percent less potable water than the indoor water use baseline calculated for the building, after meeting the Energy Policy Act of 1992 fixture performance requirements.	Show a 20% reduction of fixture potable water use from the calculated fixture water usage baseline (Energy Policy Act of 1992). Use tools such as Watergy, the LEED water calculator, the ENERGY STAR Portfolio Manager for water savings (or similar) to establish baseline usage and calculated savings or provide documentation based on metering/bills. Provide summary pages from Watergy or other water software tools. Some Federal facilities may not have a utility water meter. Because the EO 13423 requires agencies to report potable water use, agencies that have sites without metered potable water use (or 1 meter for multiple buildings) must estimate water consumption.	☐	WE Credit 2.2: Additional Indoor Plumbing Fixture Efficiency, 20 %

EO 13423 Guidance to Reduce Water Consumption

Beginning in 2008, Federal agencies must reduce water consumption intensity through life-cycle cost-effective measures, relative to the baseline of the agency's water consumption in fiscal year 2007 by 2 percent annually through the end of FY 2015 or 16 percent by the end of FY 2015. DOE Supplemental Guidance To The Instructions for Implementing Executive Order 13423 "Strengthening Federal Environmental, Energy, and Transportation Management" Establishing Baseline and Meeting Water Conservation Goals of Executive Order 13423. Executive Order 13423 requires all Federal agency heads to develop a water-use baseline based on FY 2007 water consumption. All potable water use in covered facilities should be reported, whether used for human consumption, building process, power plant or building cooling, landscape watering, irrigation, or industrial uses.

****Confirmation****

Building ID:

Signed By:

Title **Date:**

Related Mandates

http://www1.eere.energy.gov/femp/pdfs/water_guidance.pdf

Resources

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Summary Guiding Principles Checklist

High Performance and Sustainable Buildings Guiding Principles
Checklist for Existing Buildings

Building Name: Leased Office Building

Address: PNNL

This field will populate as guiding principles are completed in the compliance tabs		
	% HPSB Guiding Principles Achieved*	**75%**
	Total Achievable LEED Credits (Yes column)	**19**

Guiding Principle	Action Required	% HPSB GPs Achieved
1. Employ Integrated Design Principles		**75.0%**
Integrated design	LEED Accredited Professional·Inter-sustainable team	☑
Commissioning	Commissioning: Investigation & Analysis.	☑
	Commissioning: Implementation	☑
2. Optimize Energy Performance		
Energy Efficiency	Energy Optimization	☐
Measurement and Verification	Energy Star's Portfolio Manger or Labs 21, or equivalent	☑
	Building level utility meters	☑
	Data entered into High Performance database	☐

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Comments or Questions?

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