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Best Practices for HPSB Guiding Principles Implementation in Existing DOE Buildings

May 2014

JH Henderson

U.S. DEPARTMENT OF ENERGY

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Pacific Northwest National Laboratory
Richland, Washington 99352

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1.0 Introduction

I. Background

The intent of this paper is to document an approach to screening existing buildings at DOE sites for High-Performance and Sustainable Buildings (HPSB) Guiding Principles (GPs) potential, developing policies and programs to address a majority of the HPSB GPs, and how to prioritize buildings with the greatest potential. This paper will also include example strategies for HPSB inventory and projection schedules and best practices on approaching and interpreting select criteria that have been troublesome to sites.

II. Authority

A brief background of the Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings:

January 24, 2006: The "Federal Leadership in High-Performance and Sustainable Buildings Memorandum of Understanding (MOU)" was signed at the White House Summit on Federal Sustainable Buildings. The MOU established a common set of sustainable Guiding Principles for integrated design, energy performance, water conservation, indoor environmental quality and materials.

January 24, 2007: Executive Order (EO) 13423, "Strengthening Federal Environmental, Energy and Transportation Management" was signed to strengthen key goals for the Federal Government and require agencies to ensure new construction and major renovations comply with the 2006 "Federal Leadership in High-Performance and Sustainable Buildings Memorandum of Understanding (MOU)"

December 5, 2008: High-Performance and Sustainable Buildings Guidance was issued by the Office of Management and Budget based on recommendations from the Interagency Sustainability Working Group (ISWG). The 2008 guidance included a revised set of Guiding Principles for New Construction and a new set for Existing Buildings.

October 5, 2009: EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" was signed that set sustainability goals for federal agencies and focuses on making improvements in their environmental, energy and economic performance. One of the EO 13514 targets is as follows:

> *Ensuring that at least **15 percent** of the agency's **existing buildings** (**above 5,000 gross square feet**) and building leases (above 5,000 gross square feet) meet the Guiding Principles by fiscal year 2015 and that the agency makes annual progress toward 100-percent conformance with the Guiding Principles for its building inventory;*

III. HPSB GPs for Existing Buildings

The HPSB GPs for Existing Buildings are organized in five categories: I. Employ Integrated Design Principles, II. Optimize Energy Performance, III. Protect and Conserve Water, IV. Enhance Indoor Environmental Quality, and V. Reduce Environmental Impact of Materials. Distributed among the five categories are 29 tasks. To better understand and manage the GPs, these 29 tasks can be grouped into three types of activities with unique implementation requirements:

Policy: Campus or building policies and programs address management systems that enable a building to operate in a sustainable manner.

Deploy: Tasks that may require deployment of building-specific technologies and building operating practices (e.g. Installation of Automated Lighting Controls/Sensors, Building Meters).

Performance: The analysis of operating conditions and/or measured performance compared to baseline performance levels.

Table 1 below briefly summarizes the HPSB GPs for Existing Buildings. Along with illustrating the corresponding category in the left column (I., II., III., IV., or V) and type of activity in the right column (Policy, Deploy, or Performance), a brief description of each task is also provided for context. For additional information refer to the December 5, 2008 Updated Guidance.

Table 1 - HPSB GPs for Existing Buildings Summary

Category	Guiding Principle		Task	Activity
I. Employ Integrated Design Principles	1.1.	Integrated Assessment, Operation, and Management		
	1.1.1.	Establish an Integrated Team	Created an Integrated Project Team	Policy
	1.1.2.	Environmental Management System	Incorporate Sustainable Operations and Maintenance Practices	Policy
	1.1.3.	Assessment of Existing Conditions	Commissioning: Investigation & Analysis	Perform.
	1.1.4.	Performance Goals	Site Sustainability Plan (SSP)	Policy
	1.1.5.	Building Management Plan	Ensure Building Management Through Trainings, Seminars, Newsletters	Policy
	1.1.6.	Occupant Feedback on Work Space	Occupant Survey on Work Space Satisfaction (30% Feedback)	Perform.
	1.2.	Commissioning	Commissioning: Implementation	Deploy
II. Optimize Energy Performance	2.1.	Energy Efficiency 1	Energy Optimization, 75 Energy Star Score or Reduce by 20%	Perform.
	2.2.	Energy Efficiency 2	Use Energy Star and FEMP Designated Products (where available)	Policy
	2.3.	On-Site Renewable Energy	Implement Renewable Energy Projects (where life-cycle cost effective)	Deploy
	2.4.	Measurement and Verification	Install Building Level Meters (Electricity, Natural Gas and/or Steam)	Deploy
	2.5.	Benchmarking	Energy Star's Portfolio Manager or Labs 21, or equivalent	Perform.
III. Protect and Conserve Water	3.1.	Indoor Water	Indoor Plumbing Fixture Efficiency, Reduce by 20%	Perform.
	3.2.	Outdoor Water	Water Efficient Landscaping, Reduce by 50%	Perform.
	3.3.	Measurement of Water Use	Install Water Meter, Stormwater Management (where applicable)	Deploy
	3.4.	Process Water	Deploy Cost Effective Water Conservation Measures (where applicable)	Deploy
	3.5.	Water-Efficient Products	Use EPA's WaterSense Products and Contractors (where available)	Policy
IV. Enhance Indoor Environmental Quality	4.1.	Ventilation and Thermal Comfort	ASHRAE Standard 55 & 62.1	Deploy
	4.2.	Moisture Control	Provide or Illustrate Moisture Control Strategy	Policy
	4.3.1	Daylighting and Lighting Controls	Provide Automated Lighting Controls (where appropriate)	Deploy
	4.3.2	Daylighting and Lighting Controls	Lighting Controls or 2% Daylight Factor for 50% Occupants/Spaces	Perform.
	4.4.	Low-Emitting Materials	Use Materials and Products with Low Pollutant Emissions	Policy
	4.5.	Integrated Pest Management	Use Integrated Pest Management Techniques	Policy
	4.6.	Environ. Tobacco Smoke Control	Prohibit Smoking within 25 Feet of Building	Policy
V. Reduce Environmental Impact of Materials	5.1.	Recycled Content	Use Products Meeting EPA Recycled Content Recommendations	Policy
	5.2.	Biobased Content	Use Products Meeting USDA's Biobased Content Recommendations	Policy
	5.3.	Environmentally Preferable Products	Use EPP Designated Products	Policy
	5.4.	Waste and Materials Management	Provide Reuse and Recycle Services	Policy
	5.5.	Ozone Depleting Compounds	Eliminate the Use of Ozone Depleting Compounds	Policy

2.0 Inventory of Potential HPSBs

I. Develop List of Buildings

When approaching HPSB GPs for Existing Buildings, the first step of an agency or site should be the development of an inventory of all buildings. Prioritizing buildings to meet the Guiding Principles can be particularly challenging at DOE sites where building inventories can be somewhat fluid. Creating and maintaining an inventory of all buildings with a few key pieces of information can help to point to the best candidates and weed out those that are not viable candidates. The initial list should contain buildings constructed, renovated, leased, or purchased in whole or in part for use by the Federal Government[1] and should include the following information:

i. Building name or number
ii. Building function
iii. Square footage
iv. Vintage and year of most recent major retrofit
v. Owned or leased (length of lease)
vi. EISA covered facility[2] (Y/N)
vii. Razed or conveyed by the end of 2015 (Y/N)
viii. Measured energy and water performance (Y/N)
ix. Baseline year energy and water performance (Y/N)

Table 2 is an example inventory of buildings and the associated information that should be collected when screening buildings for HPSB appropriateness.

Table 2 - Example Building Inventory

Building ID	Building Function	Size (Square Footage)	Year Built / Major Renovation	Owned or Leased (Length of Lease)	EISA Covered	Razed or Conveyed (by end of 2015)	Measured Performance (Energy and Water)	
							Current Year	Baseline Year
217847	Office	4,500	2003	Owned	No	No	Yes	No
210259	Laboratory	25,750	1985	Owned	Yes	Yes	Yes	Yes
209677	Office	55,250	2008	Owned	Yes	No	Yes	Yes
207848	Laboratory	250,455	1990/2010	Owned	Yes	No	Yes	Yes
207847	Office	150,750	2001	Owned	Yes	No	Yes	Yes
207846	Warehouse	19,560	1966	1 Yr. Lease	No	No	Yes	No
207160	Service	7,500	1985	5+ Yr. Lease	No	No	Yes	Yes
202447	Radiochemical	63,334	1977	Owned	Yes	No	Yes	Yes
139814	Data Center	175,650	2009	Owned	Yes	No	Yes	No
117220	Office	15,000	2006	10+ Yr. Lease	No	No	Yes	No

[1] Only include buildings that consume energy or water.
[2] See '*Covered facility*' definition

II. Identify Excluded and Low Priority Buildings

The information from the developed inventory can be used to document which Federal buildings can be excluded from the HPSB GP goal and which may be lower priority or more difficult to achieve HPSB compliance.

An agency may exclude from the HPSB inventory buildings that are not subject to the HPSB requirement:

i. Any Federal building that does not expect to achieve the *de minimis* square footage (< 5,000 SF), or
ii. Any Federal building that is expected to be razed or conveyed by end of 2015

Other criteria that may be indicators of low priority HPSB buildings:

iii. Short term leases
iv. Unique building functions (e.g., large mission critical process loads or unique operations)

Table 3 illustrates how the inventory data can be used to establish candidate buildings for the HPSB goal. As shown in the table, 8 buildings have been screened for inclusion in the inventory of potential HPSBs.

Table 3 - Evaluation of Example Building Inventory

Building ID	Building Function	Size (Square Footage)	Year Built / Major Renovation	Owned or Leased (Length of Lease)	EISA Covered	Razed or Conveyed (by end of 2015)	Measured Performance (Energy and Water)		Appropriate for HPSB GP Goal
							Current Year	Baseline Year	
217847	Office	4,500	2003	Owned	No	No	Yes	No	No ✗
210259	Laboratory	25,75		Owned	Yes	Yes	Yes	Yes	No ✗
209677	Office	55,25		Owned		No	Yes	Yes	Yes ✓
207848	Laboratory	250,455	1990/2010	Owned		No	Yes	Yes	Yes ✓
207847	Office	150,750	2001	Owned	Yes	No	Yes	Yes	Yes ✓
207846	Warehouse	19,560	1966	1 Yr. Lease	No	No	Yes	No	Yes !
207160	Service	7,500	1985	5+ Yr. Leas		No	Yes	Yes	Yes ✓
202447	Radiochemical	63,334	1977	Owned		No	Yes	Yes	Yes !
139814	Data Center		2009	Owned	Yes	No	Yes	No	Yes ✓
117220	Office		2006	10+ Yr. Lease	No	No	Yes	No	Yes ✓

Less than 5,000 square footage (Remove)

Scheduled to be razed or conveyed (Remove)

Short term lease (Low Priority)

Large mission critical process loads (Low Priority)

Table 4 is an example updated HPSB inventory list after removing excluded Federal buildings. The data has been transposed in preparation for HPSB prioritization mapping.

Table 4 - Updated HPSB Inventory List

Activity	Priority Criteria	Building ID							
		209677	207848	207847	207846	207160	202447	139814	117220
Building Data	Building Function	Office	Laboratory	Office	Warehouse	Service	Radiochem.	Data Center	Office
	Size (Square Footage)	55,250	250,455	150,750	19,560	7,500	63,334	175,650	15,000
	Year Built / Major Renovation	2008	1998	2001	1966	1985	1977	2009	2006
	EISA Covered Facility	Yes	Yes	Yes	No	No	Yes	Yes	No
	Owned or Leased (Length of Lease)	Owned	Owned	Owned	1 Yr. Lease	5+ Yr. Lease	Owned	Owned	10+ Yr. Lease

3.0 Policies & Programs

Preceding the prioritization of buildings for HPSB conformance, establishing policies and programs is essential. By developing appropriate policies/programs, or highlighting existing documentation, agencies can address approximately 52 percent (15 of the 29 tasks) of the HPSB GPs for Existing Buildings. Table 5 summarizes the GP tasks generally associated with policies or programs.

Table 5 - HPSB GPs for Existing Buildings - Policy

Activity	Guiding Principle	Task	Category
Policy	1.1.1. Establish an Integrated Team	Created an Integrated Project Team	I.
	1.1.2. Environmental Management System	Incorporate Sustainable Operations and Maintenance Practices	I.
	1.1.4. Performance Goals	Site Sustainability Plan (SSP)	I.
	1.1.5. Building Management Plan	Ensure Building Management Through Trainings, Seminars, Newsletters	I.
	2.2. Energy Efficiency 2	Use Energy Star and FEMP Designated Products (where available)	II.
	3.5. Water-Efficient Products	Use EPA's WaterSense Products and Contractors (where available)	III.
	4.2. Moisture Control	Provide or Illustrate Moisture Control Strategy	IV.
	4.4. Low-Emitting Materials	Use Materials and Products with Low Pollutant Emissions	IV.
	4.5. Integrated Pest Management	Use Integrated Pest Management Techniques	IV.
	4.6. Environ. Tobacco Smoke Control	Prohibit Smoking within 25 Feet of Building	IV.
	5.1. Recycled Content	Use Products Meeting EPA Recycled Content Recommendations	V.
	5.2. Biobased Content	Use Products Meeting USDA's Biobased Content Recommendations	V.
	5.3. Environmentally Preferable Products	Use EPP Designated Products	V.
	5.4. Waste and Materials Management	Provide Reuse and Recycle Services	V.
	5.5. Ozone Depleting Compounds	Eliminate the Use of Ozone Depleting Compounds	V.

I. Mapping Global Policies & Programs to Guiding Principles

Not only do global polices directly address the majority of the GP tasks, they can provide supporting documentation for various other GPs. The seven common policies and programs listed below will meet the requirements for 15 of the GP tasks for Existing Buildings.

Environmental Management System (EMS)

EMS is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency. Sites/agencies are to incorporate sustainable operations and maintenance practices within the appropriate EMS, establish goals, roles and responsibilities.

GP-1.1.2 Environmental Management System
GP-1.1.4 Performance Goals

Sustainability Program

This program establishes an integrated team to develop and implement policy and operational performance goals for sustainability for all building and assets. Additionally, this program develops plans for occupant engagement, education and training. An integrated sustainability program will meet the requirements for:

GP-1.1.1 Establish an Integrated Team
GP-1.1.5 Building Management Plan & Tenant Education

Sustainable Purchasing Policy
This policy outlines the purchasing program ensuring that sustainable acquisition is done for building components, systems, and materials during operations and building retrofits. It provides a list of content requirements for various categories and defines targets. A sustainable purchasing policy meets requirements for:

GP-2.2 Energy Efficiency 2 (Energy Star and FEMP-Designated Products)
GP-3.5 Water-Efficient Products
GP-4.4 Low-Emitting Materials
GP-5.1 Recycled Content
GP-5.2 Biobased Content
GP-5.3 Environmentally Preferable Products

Moisture Control Policy & Phase-out Plan for Ozone Deleting Compounds
An inspection-driven moisture control strategy and a phase-out plan for CFC-refrigerants (if used) should be coupled with the campus recommissioning plan. Combining these items will support building valuation & management, and streamline conformance with the following GPs:

GP-4.2 Moisture Control
GP-5.5 Ozone Depleting Compounds

TIP: Commissioning Contracts
Along with improving the efficiency of the building, the commissioning process can provide a framework to address other Guiding Principles. For instance, the commissioning plan should include an inspection-driven moisture prevention strategy (**4.2 - Moisture Control**) as well as verify compliance with ASHRAE 62.1 and ASHRAE 55 requirements (**4.1 – Ventilation and Thermal Comfort**). The commissioning process should also yield a Building Operating Plan/Manual including a lighting control schematic (**4.3.1 & 4.3.2 Daylighting and Lighting Controls**) as well as a more detailed HVAC status report and inventory of ozone depleting compounds (**5.5 – Ozone Depleting Compounds**). This type of information about a facility will not only help inform future upgrades, phase-out plans, and operational decisions, but also help correlate occupant feedback streams (**1.1.6 – Occupant Feedback**) with actual building data (e.g. thermal comfort and lighting complaints). It is vital to ensure commissioning contracts are put in place to strategically address these requirements.

Integrated Pest Management Policy
This policy establishes pest management techniques as appropriate to minimize pesticide usage. It establishes a contract for the purchase of EPA registered pesticides only or contractors that use EPA registered pesticides.

GP-4.5 Integrated Pest Management

Smoking Policy
This policy prohibits smoking within the building and within 25 feet of all building entrances, operable windows, and building ventilation intakes.

GP-4.6 Environmental Tobacco Smoke Control

Solid Waste Management Policy
This policy encompasses all ongoing consumables, durable goods, and materials used during facility alterations and additions. It provides a list of all material to be recycled, recycling locations, and targets.

GP-5.4 Waste and Materials Management

4.0 Prioritization Process

With global policies and programs in place, the residual HPSB GP tasks are building specific, and can be used to prioritize buildings for GP conformance. The remaining 48 percent (14 of the 29 tasks) can be grouped into two activities: **Deploy** (tasks that may require deployment of building-specific technologies and building operating practices) and **Performance** (the analysis of operating conditions and/or measured performance compared to baseline performance levels). The following two tables (Table 6 and Table 7) summarize the two activities and the associated GP tasks:

Table 6 - HPSB GPs for Existing Buildings - Deploy

Activity	Guiding Principle		Task	Category
Deploy	1.2.	Commissioning	Commissioning: Implementation	I.
	2.3.	On-Site Renewable Energy	Implement Renewable Energy Projects (where life-cycle cost effective)	II.
	2.4.	Measurement and Verification	Install Building Level Meters (Electricity, Natural Gas and/or Steam)	II.
	3.3.	Measurement of Water Use	Install Water Meter, Stormwater Management (where applicable)	III.
	3.4.	Process Water	Deploy Cost Effective Water Conservation Measures (where applicable)	III.
	4.1.	Ventilation and Thermal Comfort	ASHRAE Standard 55 & 62.1	IV.
	4.3.1	Daylighting and Lighting Controls	Provide Automated Lighting Controls (where appropriate)	IV.

Table 7 - HPSB GPs for Existing Buildings - Performance

Activity	Guiding Principle		Task	Category
Performance	1.1.3.	Assessment of Existing Conditions	Commissioning: Investigation & Analysis	I.
	1.1.6.	Occupant Feedback on Work Space	Occupant Survey on Work Space Satisfaction (30% Feedback)	I.
	2.1.	Energy Efficiency 1	Energy Optimization, 75 Energy Star Score or Reduce by 20%	II.
	2.5.	Benchmarking	Energy Star's Portfolio Manager or Labs 21, or equivalent	II.
	3.1.	Indoor Water	Indoor Plumbing Fixture Efficiency, Reduce by 20%	III.
	3.2.	Outdoor Water	Water Efficient Landscaping, Reduce by 50%	III.
	4.3.2	Daylighting and Lighting Controls	Lighting Controls or 2% Daylight Factor for 50% Occupants/Spaces	IV.

With the HPSB inventory established (see Table 4), the follow information should be collected for each building in order to prioritize for HPSB GP conformance:

Occupant Feedback Mechanism

GP-1.1.6 Occupant Feedback on Work Space

- Are mechanisms in place to augment building operations maintenance using occupant feedback on work space satisfaction? (e.g., annual occupant survey)

Commissioning Status/Schedule

The recommissioning program should be tailored to the size and complexity of the building and its system components, deployed on a four-year cycle, and must have been performed and documented within four years prior to reporting a building as meeting the Guiding Principles.

GP-1.1.3 Commissioning: Investigation & Analysis

GP-1.2 Commissioning: Implementation

- When was the last commissioning or recommissioning performed?
- When is the next recommissioning scheduled?

TIP: Commissioning

To fulfill the requirement of the commissioning component of the energy and water evaluations, DOE recommends a two-step approach:

1) Initial Assessment. The first step is to conduct an initial assessment/walk-through of the buildings. If the initial assessment indicates that the building does not call for more detailed commissioning, then the commissioning requirement for the building is met (assuming all minor adjustments/repairs are properly addressed).

2) Detailed Re/Retro-commissioning Evaluation. The second step, if needed, is a more detailed commissioning or evaluation of the buildings identified as economically viable from the initial assessment. Often additional operations and maintenance opportunities will be identified through this step.

Metering Assessment (Energy and Water)

GP-2.4 Measurement and Verification

- Are energy meter(s) installed that account for the total energy consumption for this building?

GP-3.3 Measurement of Water Use

- Are water meter(s) installed that account for the total water consumption for this building? (Encouraged but not required)

Energy Performance

GP-2.1 Energy Efficiency 1

- If applicable, does the building have an ENERGY STAR® rating of 75 or higher or an equivalent Labs21 Benchmarking Tool score?
- What is the current building energy use compared to the building energy use in 2003 or a year thereafter with quality energy use data?

TIP: Selecting Baselines

The required baseline year for both water and energy performance is 2003 or a year thereafter with quality usage data. If 2003 data is not available, a different year can be used. Also, if there was a major renovation or modification in the building design and/or mission after 2003, it may be reasonable to use a select a different baseline year. It is recommended to provide evidence of the justification and analysis indicating such. It is also recommended that baseline years stay consistent during future HPSB GP conformance evaluations.

ASHRAE Standards Documentation

Meet ASHRAE Standard 55-2004 Thermal Environmental Conditions for Human Occupancy and ASHRAE Standard 62.1-2007: Ventilation for Acceptable Indoor Air Quality.

GP-4.1 Ventilation and Thermal Comfort

- Is there documentation of compliance with ASHRAE standards from an experienced individual or team? (e.g., a commissioning report)

Indoor Water Performance

GP-3.1 Indoor Water

- What is the calculated potable water use compared to the calculated baseline (120% of 2006 UPC or IPC for fixtures installed in 1994 or later and 140% of 2006 UPC or IPC for fixtures installed prior to 1994)?
- What is the current building potable water use performance compared to the potable water use in 2003 or a year thereafter with quality water data?

TIP: Estimating Indoor Water Use

If a building level water meter is not installed, or the measured water performance falls short of the 20% reduction requirement, there is another option for conformance. This option requires an inventory of the plumbing fixtures and fittings. It is recommended that manufacturer or supplier data verifying flow rates for each fixture type is collected and used to estimate the usage compared to 2006 UPC/IPC efficiency requirements. There are a number of tools to help facilitate this calculation, Figure 1 shown above is an example of a PNNL-developed tool that calculates the estimated water use based on installed flow rates and compares it to the estimated water consumption for standard flow rates.

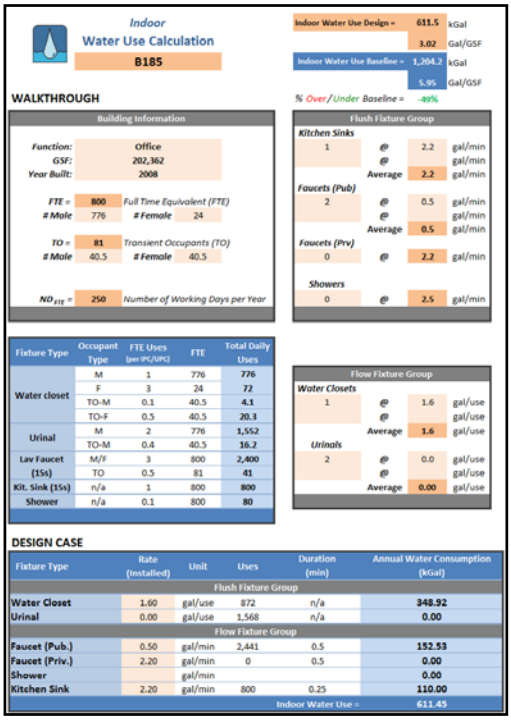

Figure 1 - Example Indoor Water Use Calculation

Outdoor Water Performance

GP-3.2 Outdoor Water

- What is the calculated potable irrigation water use compared to conventional methods?
- What is the current potable irrigation water use compared to potable irrigation water use in 2003 or a year thereafter with quality water data?

TIP: Estimating Outdoor Water Use

If a building level irrigation water meter is not installed, or the measured water performance falls short of the 50% reduction requirement, there is another option for conformance. Similar to the indoor water calculation, there are ways to estimate irrigation water used compared to conventional methods. There are three resources that can provide guidance on estimating current water use and conventional methods (baseline):

- LEED reference guide - http://www.usgbc.org/resources/leed-reference-guide-building-design-and-construction
- FEMP Guidance - http://www1.eere.energy.gov/femp/pdfs/est_unmetered_landscape_wtr.pdf
- EPA Water Budget Tool - http://www.epa.gov/watersense/water_budget/application.html

Automated Lighting Controls/Sensors

GP-4.3.1 Daylighting and Lighting Controls

- Are automated lighting controls (occupancy/vacancy sensors with manual-off capability) provided for appropriate spaces?

Individual Lighting Controls and/or Daylighting

GP-4.3.2 Daylighting and Lighting Controls

- What percent of regularly occupied spaces has occupant controlled lighting, allowing adjustments to suit individual task needs?
- Does the building have a daylight factor of at least 2 percent (excluding all direct sunlight penetration) in 50 percent of all space occupied for critical visual tasks?

TIP: Daylighting & Lighting Controls

Individual lighting controls (task lighting) is an easy requirement for most office spaces. This can be accomplished with individual offices with lighting controls or desk lamps used for task lighting. This option can become difficult for unique facilities or buildings that have been renovated and no longer align with the original lighting scheme. The other option is achieving 2% Daylighting, which can be difficult to calculate and is tough for older buildings to meet. A simplest rule of thumb is Daylighting Factor = 0.1 x Percentage of glass to floor area. Although this technique is not as accurate compared to a detailed calculation method or modeling, it is simple and generally adequate for demonstrating GP compliance.

Table 8 illustrates how the criteria could be used to prioritize potential HPSBs.

Table 8 - HPSB Inventory Prioritization

Activity	Priority Criteria	Building ID							
		209677	139814	207847	207848	117220	202447	207160	207846
Building Data	Building Function	Office	Data Center	Office	Laboratory	Office	Radiochem.	Service	Warehouse
	Size (Square Footage)	55,250	175,650	150,750	250,455	15,000	63,334	7,500	19,560
	Year Built / Major Renovation	2008	2009	2001	1998	2006	1977	1985	1966
	EISA Covered Facility	Yes	Yes	Yes	Yes	No	Yes	No	No
	Owned or Leased (Length of Lease)	Owned	Owned	Owned	Owned	10+ Yr. Lease	Owned	5+ Yr. Lease	1 Yr. Lease
Deploy	Last / Anticipated Commissioning Date	FY12/FY16	FY13/FY17	FY12/FY16	FY10/FY14	FY10/FY14	FY13/FY17	FY08	FY09
	ASHRAE 55 & 62.1 Standards Documentation	Yes	Yes	Yes	No	Yes	Yes	No	No
	Building Level Energy Meters	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Building/Campus Water Meters	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	Automated Lighting Controls/Sensors	Yes	Yes	Yes	Yes	Yes	No	No	No
Performance	Occupant Feedback Mechanisms (Surveys)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	Energy Performance (20% Reduction)	ENERGY STAR 75th	-51%	-15%	-18%	ENERGY STAR 93rd	26%	10%	N/A
	Indoor Water Performance (20% Reduction)	-32%	-35%	-33%	-20%	-28%	46%	-10%	N/A
	Outdoor Water Performance (50% Reduction)	-60%	-33%	-50%	-100%	-40%	-51%	-100%	N/A
	Individual Lighting Controls (50% of Occupants)	100%	65%	45%	75%	100%	35%	25%	100%
	2% Daylighting Factor (50% of Occupants)	Yes	No	Yes	No	No	No	No	No
	Priority	1	2	3	4	5	6	7	8

Focusing on the building-specific tasks and tracking conformance in a database or worksheet allows for easy portfolio management and prioritization of the HPSB inventory. In the table above, the buildings have been prioritized and ranked based on their performance relative to the target, and the remaining deployment activity. As shown in the example, one building currently conforms with the HPSB GPs for Existing Buildings, two buildings need only minor improvements in energy and water performance, two

buildings are to be commissioned in the near future which may improve their performance, and three buildings need significant deployment activity and improved performance, which places them low on the priority ranking. Previously collected building data can also be used in the priority ranking. For instance, covered facilities under the EISA reduction goal will have higher priority than non-EISA covered facilities. HPSB buildings that are owned or have long-term leases should also have higher priority.

5.0 Projecting and Tracking HPSB Conformance

The prioritization table developed previously (Table 8) can also be used to establish HPSB conformance projections. Setting goals and projecting conformance schedules will help to focus on targeted performance objectives, align deployment activity (e.g., recommissioning, automated lighting controls) and keep track of the overall 15% HPSB Goal. Table 9 below illustrates a simple projection schedule. In this example, the site will reach the 15% Goal by 2015 and progress towards 100% conformance by 2020. Percent HPSB compliance (%HPSB) is computed by the following formula:

$$\%HPSB = \frac{\#\ of\ HPSB\ in\ Compliance}{Total\ \#\ of\ HPSB\ in\ Inventory} \times 100$$

TIP: EPA ENERGY STAR Portfolio Manager

The December 2013 Presidential Memorandum provided that each agency shall ensure that energy and water metered data is entered into the EPA ENERGY STAR Portfolio Manager (Portfolio Manager) to better manage energy and water performance and allow for benchmarking. Portfolio Manager is an under-utilized, free and simple tool that can be used to track building-level energy and water use. It also offers a tool for tracking to the High Performance Sustainable Building Guiding Principles. Using Portfolio Manager can help streamline the conformance of the following GPs**: 2.3 On-Site Renewable Energy**, **2.1 Energy Efficiency 1**, **2.4 Measurement and Verification**, **2.5 Benchmarking, 3.1 Indoor Water**, **3.2 Outdoor Water**, **3.3 Measurement of Water Use**, and **4.1 Ventilation and Thermal Comfort**.

Table 9 - Example HPSB Conformance Schedule

Building ID	Building Function	Fiscal Year 2014	2015	2016	2017	2018	2019	2020
209677	Office	GP Certified						
139814	Data Center	Performance (Outdoor Water)	GP Certified					
207847	Office		Performance (Energy Perform.)	GP Certified				
207848	Laboratory	Deploy (Commissioning)	Performance (Energy Perform.)	Performance (Energy Perform.)	GP Certified			
117220	Office	Deploy (Commissioning)	Performance (Outdoor Water)	GP Certified				
202447	Radiochem.			Deploy (Lighting Controls)	Deploy (Commissioning)	Performance (Energy Perform.)	Performance (Water Perform.)	GP Certified
207160	Service				Deploy (Lighting Controls)	Deploy (Commissioning)	Performance (Energy Perform.)	GP Certified
207846	Warehouse		Disposed					
305568	New Office					GP Certified LEED-Gold		
	%HPSB	(1/8)x100 = 13%	(2/7)x100 = 29%	(4/7)x100 = 57%	(5/7)x100 = 71%	(6/8)x100 = 75%	(6/8)x100 = 75%	(8/8)x100 = 100%

6.0 Conclusion

To summarize, agencies or sites with multiple buildings should approach and prioritize existing buildings for HPSB GP potential in the following manner:

1. Develop an inventory of all agency or site buildings constructed, renovated, leased, or purchased in whole or in part for use by the Federal Government and which consumes energy or water. Inventory should include: Building name or number, Building function, Square footage, Vintage and year of most recent major retrofit, Owned or leased?, EISA covered facility?, Razed or conveyed by end of 2015?, Measured energy and water performance?, Baseline year energy and water performance?

2. Exclude any Federal building that does not achieve the *de minimis* square footage (5,000 SF), or that is expected to be razed or conveyed by the end of 2015.

3. Develop appropriate policies/programs, or highlighting existing documentation, to address the majority of the HPSB GPs for Existing Buildings.

4. Prioritize buildings for GP conformance using the developed HPSB inventory data tracked against the remaining building specific HPSB GP tasks.

5. Establish HPSB conformance projections using prioritization criteria. Setting goals and projecting conformance schedules will help to focus on targeted performance objectives, align deployment activity and keep track of the overall 15% HPSB Goal.

Appendix A

Definitions

Commissioning Process:[1]
A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

> **Continuous Commissioning Process**:
> A continuation of the Commissioning Process well into the Occupancy and Operations Phase to verify that a project continues to meet current and evolving Owner's Project Requirements. Continuous Commissioning Process activities are ongoing for the life of the facility.
>
> **Re-Commissioning:**
> An application of the Commissioning Process requirements to a project that has been delivered using the Commissioning Process. This may be a scheduled recommissioning developed as part of a Continuous Commissioning Process, or it may be triggered by use change, operations problems, or other needs.
>
> **Retro-Commissioning**:
> The Commissioning Process applied to an existing facility that was not previously commissioned. This guideline does not specifically address retro-commissioning. However, the same basic process needs to be followed from Pre-Design through Occupancy and Operations to optimize the benefits of implementing the Commissioning Process philosophy and practice.

Covered facility:
A facility that an agency has identified in compliance with section 432 of the Energy Independence and Security Act of 2007 (Pub. L. No. 110-140, as codified at 42 U.S.C. § 8253(f)) as attributing to at least 75 percent of an agency's total facility energy use. A covered facility may be defined as a single building or a group of facilities at a single location or multiple locations managed as an integrated operation. An energy manager must be designated for each covered facility.

Daylighting:[2]
Daylighting is the controlled admission of natural light—direct sunlight and diffuse skylight—into a building to reduce electric lighting and saving energy. By providing a direct link to the dynamic and perpetually evolving patterns of outdoor illumination, daylighting helps create a

[1] *See* Whole Building Design Guide - Commissioning Definitions (Adapted from ASHRAE Guideline 0-2005) at http://www.wbdg.org/pdfs/comm_def.pdf

[2] See Whole Building Design Guide – Daylighting Description at http://www.wbdg.org/resources/daylighting.php

visually stimulating and productive environment for building occupants, while reducing as the total building energy costs.

Federal building:
Any building, structure, or facility, or part thereof, including the associated energy or water consuming support systems, which is constructed, renovated, leased, or purchased in whole or in part for use by the Federal Government and which consumes energy or water; such term also means a collection of buildings, structures or facilities and the energy or water consuming support systems for such collection.

Water:
Water supplied to a Federal building (e.g., potable water, non-potable water, and alternative water) used in any application (e.g., industrial applications, landscaping, golf and recreational applications, and agricultural applications).

> **Non-potable water:**
> Water obtained from freshwater sources that is not of sufficient quality for human consumption and has not been properly treated or has not been permitted and approved for human consumption.
>
> **Potable water:**
> Water that is of sufficient quality for human consumption and is obtained from public water systems or from freshwater sources such as lakes, streams, and aquifers which are classified, permitted, and approved for human consumption.

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