Blazing a Green Building Trail: Strategies for Assessing and Greening Agency Building Inventories

Presentation for the Federal Facilities Council

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Overview

- DOE Policy Framework:
  - Establishing requirements and expectations
  - Embracing Sustainability within the Organization
- Getting to 15% by 2015
  - Assessing a Building Portfolio
  - Identifying Greening Options
  - Tracking and Reporting
- Building Assessment Tools
- Observations and Lessons Learned

DOE Policy Framework

- Department formally required integrating "sustainability" into new construction and major renovations in 2006 (after signing Federal Green Building MOU)
  - Some DOE sites/programs on the leading edge of green buildings from the start
- Embedded EO 13423 sustainable building goals into DOE Goals & Orders in 2007-08

DOE Policy Framework

- New Construction:
  - All new building construction projects required to comply with the Guiding Principles
  - Building projects over $5M (new construction and major renovation) required to achieve LEED Gold certification
  - Top-Level commitment at Headquarters
  - Leadership by the DOE Laboratories

DOE Policy Framework

- Leasing:
  - DOE established a preference for LEED Gold when seeking new leased space
    - If LEED Gold is not available, preference for LEED Silver, and then Certified
    - If none, then space conforming to the Guiding Principles for High Performance and Sustainable Buildings is preferred
    - DOE communicated this preference to GSA
  - DOE is incorporating LEED and Guiding Principle preferences into lease renegotiations

DOE Policy Framework

- Existing Buildings:
  - Established Agency requirement to address the “15% by 2015” goal
  - Requirement flowed down to Programs and Sites
  - Internal DOE working group developing strategies to meet all the HPSB goals, including “15% by 2015”
    - Working group developed a multi-step approach to get to 15%
    - New assessment and tracking tools developed

Embracing Sustainability

- Goals and policies are necessary, but not sufficient, to achieve success
- Teamwork, Tools, and Top-level support are critical as well
  - Teamwork: sustainability is inherently cross-cutting—no one organization owns it
  - Tools: integrating sustainability into existing processes is not always straightforward
  - Top-level support: important to manage the institutional resistance to change, secure funds needed to implement sustainability

15% by 2015: Swallowing an Elephant?

Office of Health, Safety and Security

Three reasons why the 15% by 2015 goal is the most challenging requirement of EO 13423:

1. Relatively few new buildings in the pipeline; compliance will require addressing existing inventory
2. Minimal experience in “greening” existing buildings; lack of metrics, practical knowledge
3. Integrating sustainability is a group effort; multiple parties must be involved to achieve success

Success requires a multi-year, multi-party effort

- Like swallowing an elephant: one bite at a time

First Steps: Determine Baseline, Eliminate Noise

- Determine your baseline inventory
  - Identify exclusions—reduce noise
  - Will you focus on buildings or square footage?
- Determine your target population
  - 15% goal leaves latitude to skip the difficult cases
  - Prioritize a small subset of buildings—reduce more noise
- Identify existing buildings that meet the Sustainability Requirements
  - Does it have the USGBC plaque on the wall?
  - Can you demonstrate it complies with the Guiding Principles?

Determining the DOE Candidate Inventory

Number of Owned Buildings	9,872
Total Owned Square Footage	121,617,541
% above CAT	52.76% buildings / 89.70% sq. ft.
Other Building Threshold (OBT)	Includes all enduring buildings: - Greater than 1,000 square feet - Not shut down or outgranted - Will not be excessed by 2015
% of buildings above OBT	4,635 buildings (47% of total)
% square footage above OBT	72,462,514 (60% of total)

Buildings above the OBT comprise the Candidate Inventory

Generic Campus Greening Strategy

1. Form team and determine list of appropriate buildings
   Get the right people; focus on the right targets
2. Conduct “tabletop” assessments of selected buildings
3. Select best buildings to achieve 15% goal
   Fewer is better—keep it as simple as possible
4. Refine project costs/schedules estimates to achieve 15% goal
   Integrate into site planning and budgeting
5. Implement projects and track annual progress

HPSB Assessment

- Assessment: a combination of a visual inspection and measurements to determine performance. The Assessment uses a set of standards to identify:
  - Site characteristics
  - Water use
  - Energy use
  - Materials and Resources, and
  - Indoor Environmental Quality
- Informal assessment is used to “triage” projects in the early stages
- Formal assessment required to document HPSB compliance
  - Critical to assign responsibility and accountability
  - Quality control and quality assurance is important

DOE ASSESSMENT TOOLS

Integrating the Guiding Principles with the LEED NC and EB Worksheets

The DOE HPSB Assessment Tool is available at:

http://www1.eere.energy.gov/femp/controlledaccess/sustainable_eo13423.html

New Construction

- The High Performance and Sustainable Buildings Guiding Principles (HPSB GP) have been matched with the LEED® New Construction (NC) credits.
- The LEED® credits that relate to the HPSB Guiding Principles are highlighted. Achieving all of the HPSB GP related credits will result in a potential LEED® Certified rating.
- Additional credits must be achieved to achieve LEED® GOLD.

LEED-NC has established credit scoring system and technical criteria

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

Existing Building Portfolio—15% by 2015

- Created assessment tool to facilitate & document compliance procedure
- DOE has modified the LEED® Existing Building Operations and Maintenance project checklist to serve as an assessment tool to match LEED credits to the corresponding Guiding Principles.
- The LEED® project checklist is a “planning and assessment tool” to identify measures for buildings.
- Created Summary Checklist to track Compliance.

DOE Assessment Tool (Excel base 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 (Excel base model)

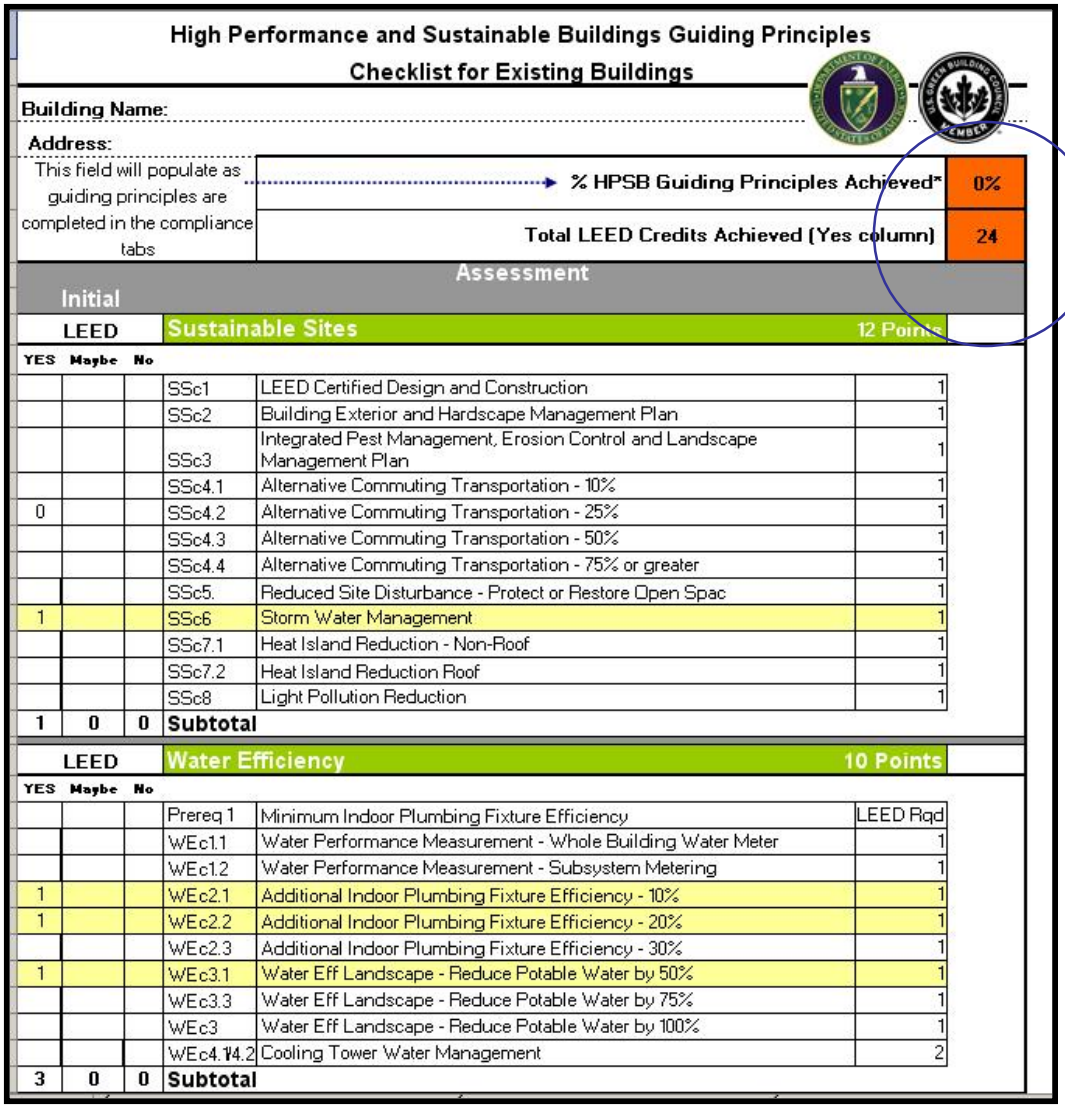
Implementation Strategy

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

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

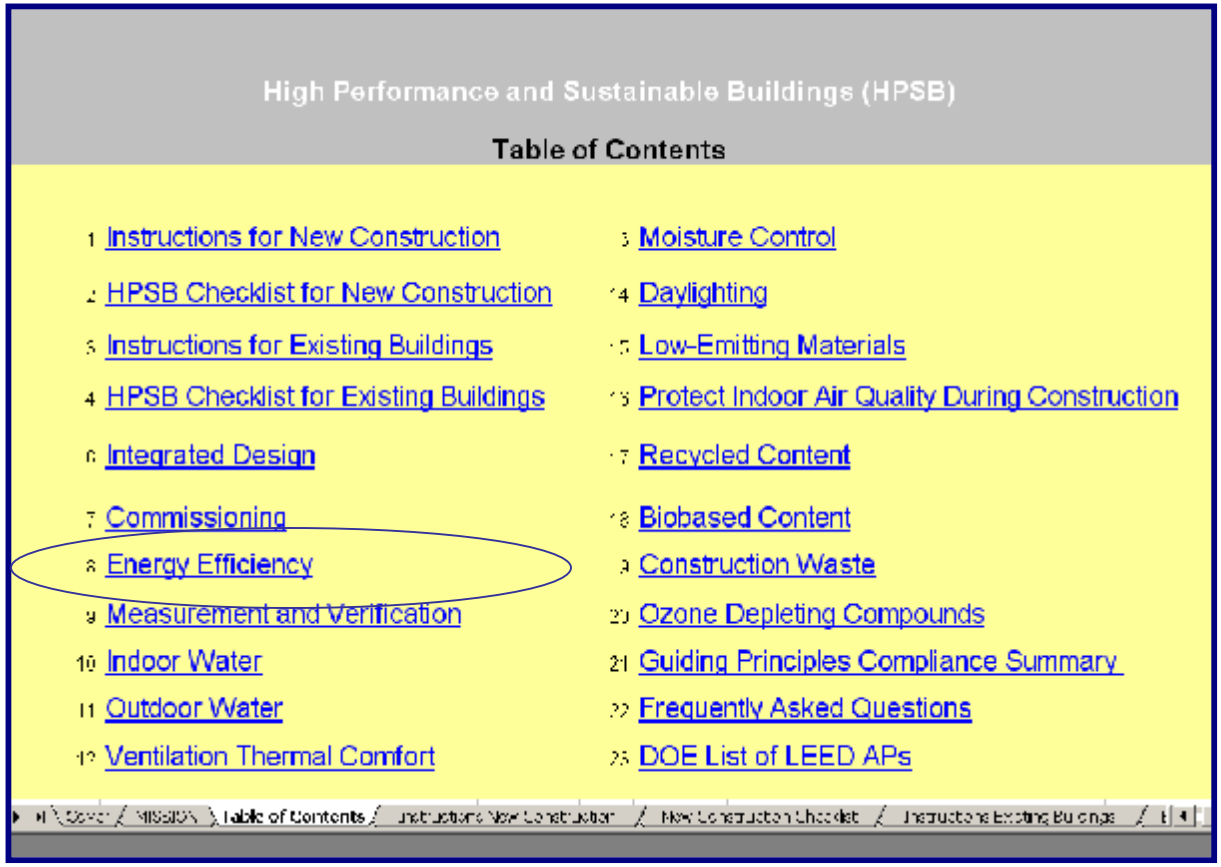
Initial

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**		

Implementation Strategy

Step 2: In order to conform to the HPSB Guiding Principles, sites shall document performance through the use of the individual tabs (integrated design, commissioning, energy efficiency, etc) to evaluate and validate each guiding principle.



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 | Daylig

Compliance tabs

Guiding Principle V. Reduce Environmental Impact of Materials: Biobased Content

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: For USDA-designated products, use products meeting or exceeding USDA's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products.	Establish Model Contract and Specification Language for the purchase of USDA-designated products, use products meeting or exceeding USDA's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products.	☐	MR Prerequisite 1: Sustainable Purchasing Policy (sustainable purchases of at least 40% of total purchases on cost basis) MR Credit 1.1 Sustainable Purchasing, Ongoing Consumables MR Credit 2.2 Sustainable Purchasing, Durable goods, Furniture

Confirmation

Building ID:

Signed By:

Title :

And adhere to the following Federal Acquisition Regs:
-FAR 52.223-1and 2 Biobased products Preference Provision and Clause

http://www.wbdg.org/references/mou_bc.php
http://www.biopreferred.gov/Default.aspx?SMSESSION=NO
http://www.biopreferred.gov/Catalog.aspx

IAQ During Construction | Recycled Content | Biobased Content

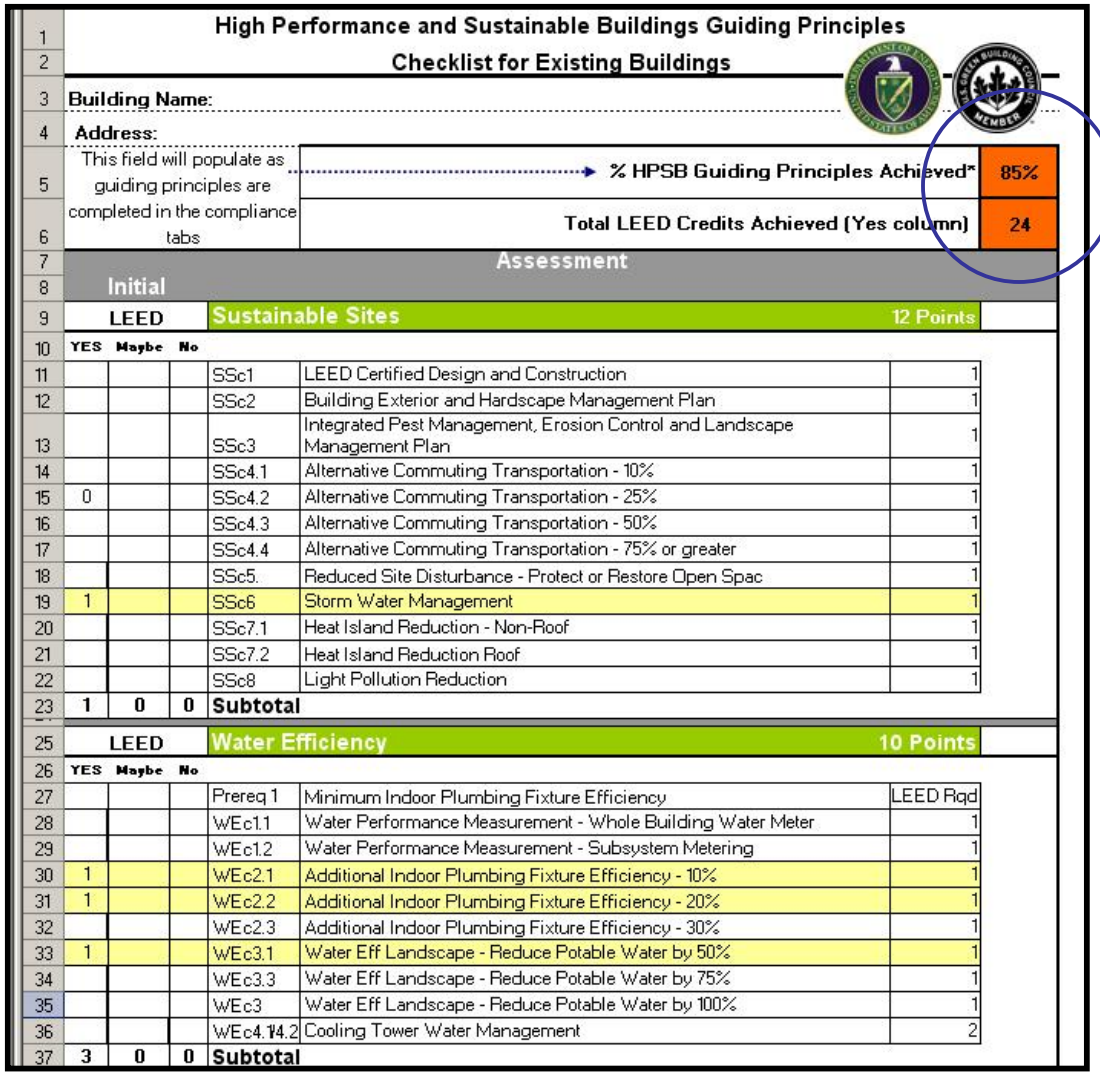
Construction Specification:
Materials and Resources:
Recycled Content. Percentage of building materials (by cost) that contain post consumer and/or post-industrial recycled content.
Locally Manufactured. Percentage of building materials (by cost) manufactured regionally within a 500-mile radius.
Locally Harvested. Percentage of building materials (by cost) harvested and extracted within a 500 mile radius.
Rapidly Renewable. Percentage of building materials (by cost) that are rapidly renewable
Resource Reuse. Percentage of building materials (by cost) that are salvaged, refurbished or reused
Rapidly renewable materials can be planted and harvested in less than a 10 year cycle. Examples include bamboo flooring, cotton batt insulation, poplar OSB (oriented strand board) and linoleum (i.e., marmoleum) flooring. Include table as an appendix,; list all products purchased for the building and those that are rapidly renewable to determine the % of rapidly renewable building materials. The LEED™ reference template may be used.

Contract and/or Bid specification

Existing Buildings Checklist

Step 2:

The total percent of the HPSB Guiding Principles achieved is tabulated when the Compliance Tabs for each GP is checked (integrated design, commissioning, energy efficiency, etc).



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

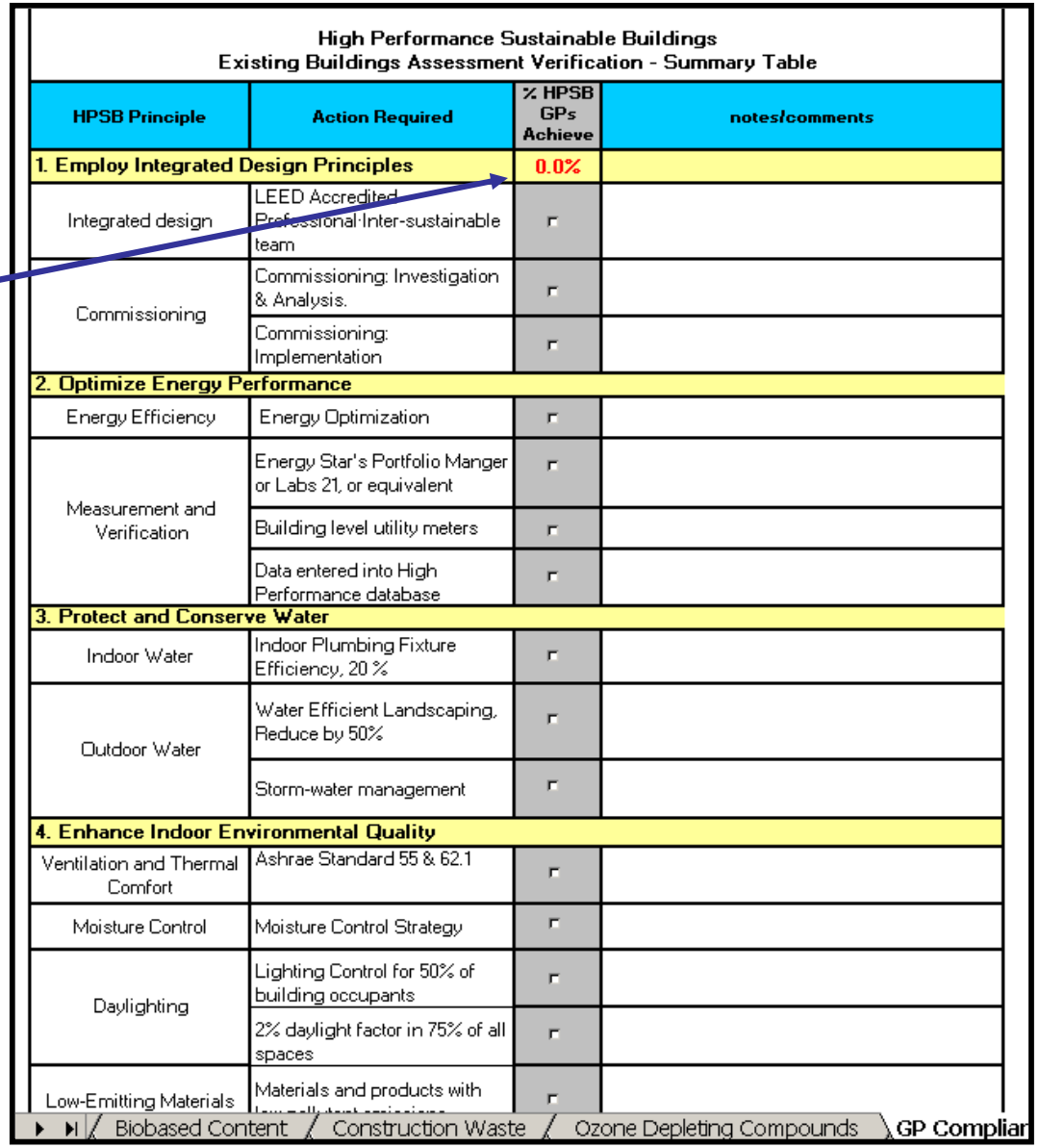
LEED	YES	Maybe	No	Sustainable Sites		12 Points
				SSc1	LEED Certified Design and Construction	1
				SSc2	Building Exterior and Hardscape Management Plan	1
				SSc3	Integrated Pest Management, Erosion Control and Landscape Management Plan	1
				SSc4.1	Alternative Commuting Transportation - 10%	1
	0			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	YES	Maybe	No	Water Efficiency		10 Points
				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**		

HPSB Assessment Summary Table

Compliance Forms also tabulate a Guiding Principle Assessment Summary Table.

Provides area for comments/notes on meeting Guiding Principles.



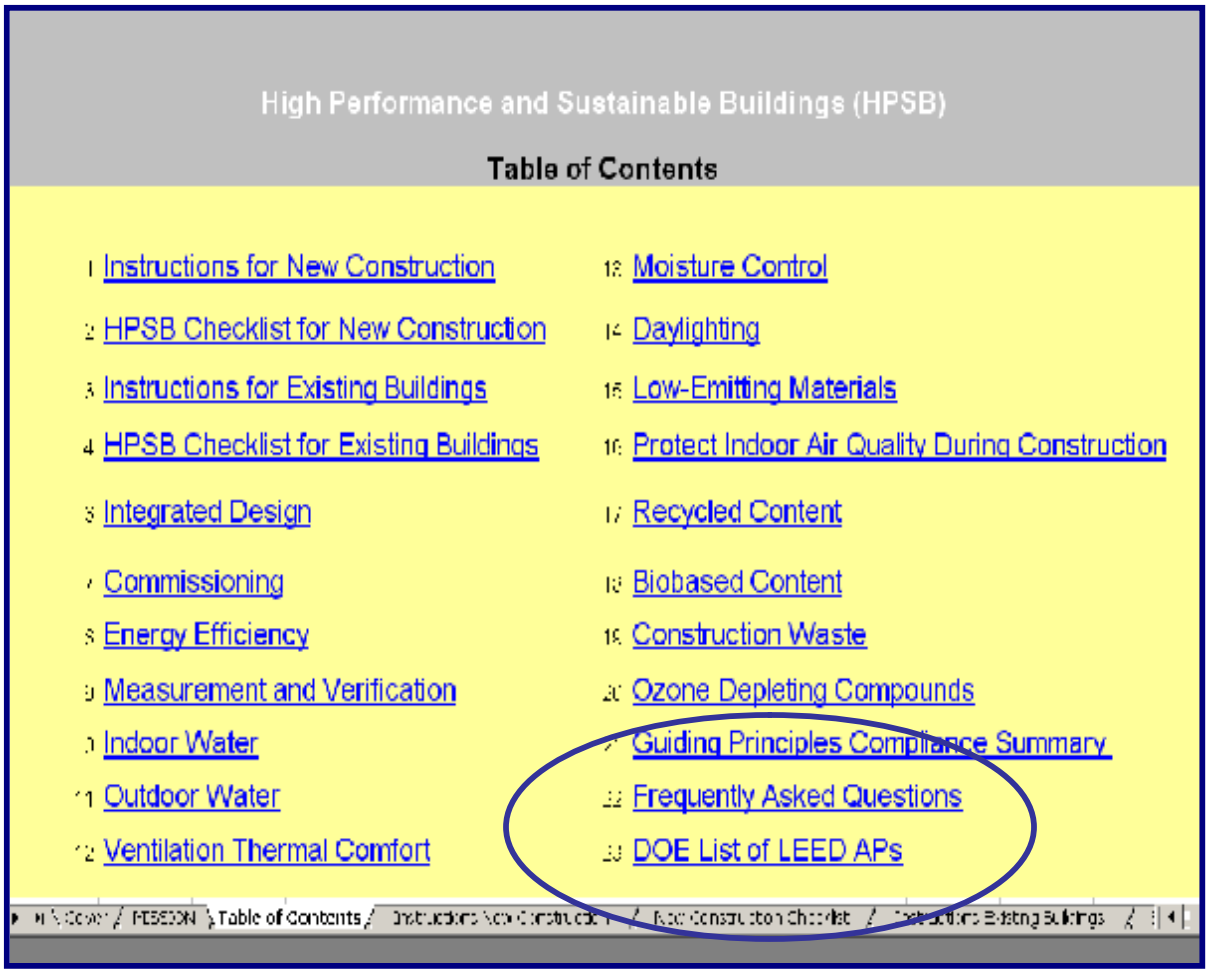
High Performance Sustainable Buildings
Existing Buildings Assessment Verification - Summary Table

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

Existing Building Assessment

Assessment Tool provides easy access to FAQs and a list of DOE LEED APs



Assessments Conducted and Planned (FY 08 data)

- 2,661 buildings were assessed for sustainability
  - 43% of *Candidate Inventory* (CI) square footage
- 2,256 buildings were assigned dates by which sustainability assessments are to be conducted.
  - Comprise 61% of square footage
- 20 buildings (1.7M ft^2) reported as sustainable
  - 2.2% of square footage
- Applied “business rules” to complete assessments

Tracking and Reporting Progress

- DOE uses FIMS (Facility Information Management System) as the sole source for its real property data
- FIMS now includes sustainability metrics
  - Results from existing building assessments entered into FIMS
  - Agency calculates progress towards 15% using FIMS data
  - Assessment data (calculations, spreadsheets and similar information) is maintained by the site, along with all supporting documentation

The Next Step: Validating Assessment Data

HSS
Office of Health, Safety and Security

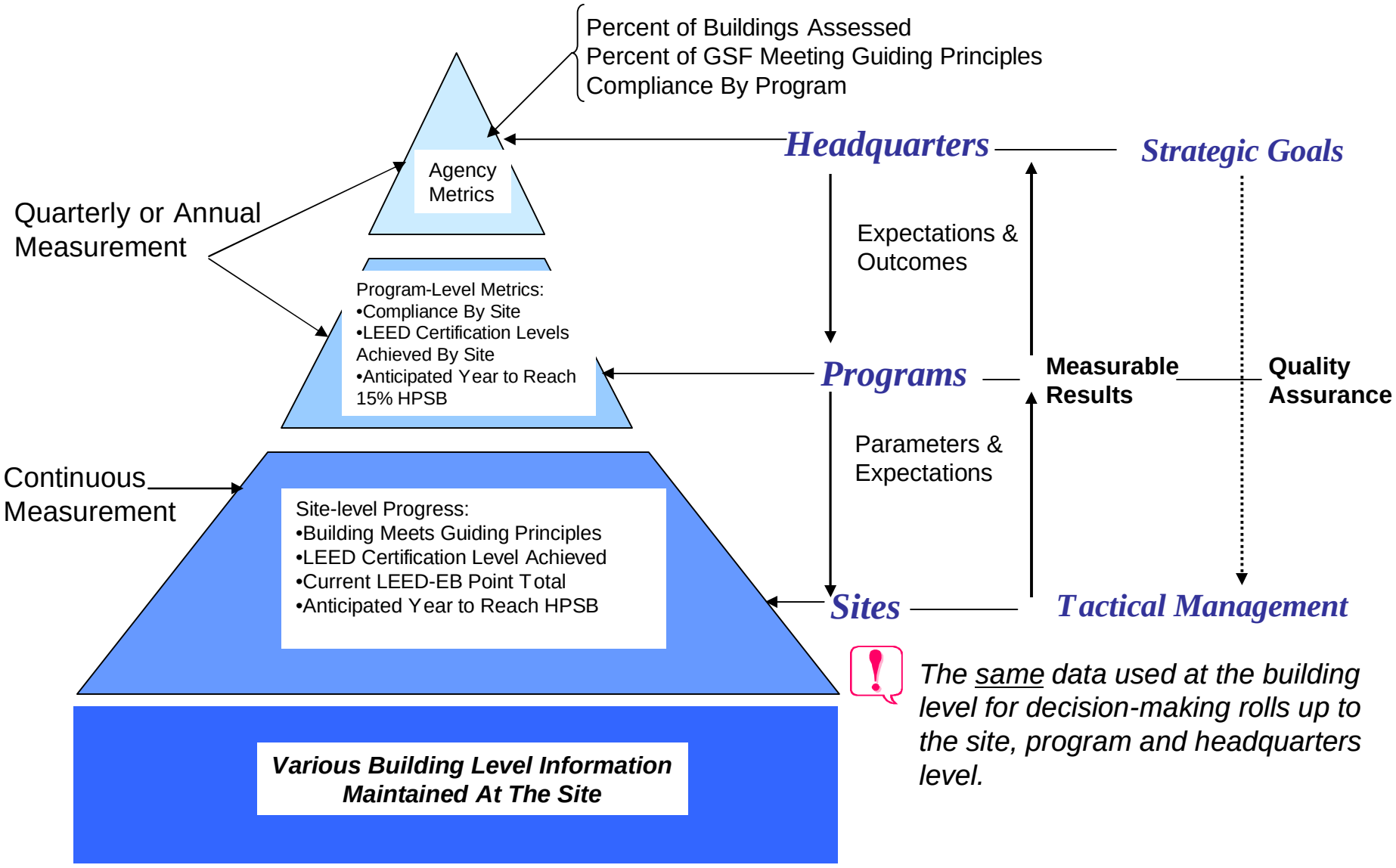
DOE already has a robust FIMS validation process

- Sites validate their data each year
- HQ review teams visits sites on a rotating basis
  - Sites typically gets a HQ review every 4 years
  - More frequent visits when problems are identified

DOE Incorporating Sustainability Data Review into the FIMS Validation Process

- Sites must validate sustainability data annually
- HQ teams will include review of sustainability data
  - Focus on buildings claiming to meet the Guiding Principles
- Reviews will follow the criteria embedded in the DOE Assessment Tool

Performance Measures
(Aligns to DOE Management Processes)



The <u>same</u> data used at the building level for decision-making rolls up to the site, program and headquarters level.

On the Horizon: Greenhouse Gas (GHG) Management

Office of Health, Safety and Security

Greenhouse Gas tracking and mitigation is coming

- EPA to us Clean Air Act to regulate GHGs
- Legislation and Executive Order are likely to establish aggressive GHG reduction goals
- Agencies will need GHG management plans that align with new requirements

Emphasize Sustainable Design, Construction, and O&M as GHG Management Tool

- Buildings are DOE's largest emissions source
- Significant opportunities for reductions

Key Observations

- Sustainability cuts across sites/agencies
  - Need to look beyond design and construction to integrating sustainability cradle to grave
  - Sustainability will be key to GHG management
- Integration is key to success
  - Need to integrate energy and environment into design, construction, operations, and maintenance
  - Involve key stakeholders at site and HQ level
- Look at organizations, not just buildings
  - Plans and policies, Campus-wide approaches
  - Leverage site Environmental Management Systems

Questions? Comments?

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