

# LEED – Existing Buildings Operations & Maintenance

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# Introductions

- Who are we?
  - Deb Frank
    - VP of Sustainability at Missouri Botanical Garden
    - Owner – CBEC
  - Emily Andrews, LEED AP O+M
    - Executive Director for USGBC-MO Gateway Chapter
    - Volunteer Coordinator / IEQ Team - CBEC

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# What IS the LEED Community Project?

- Part of our effort to make every building a **GREEN** building.
- Provide healthier and more efficient building for a non-profit that supports our community!
- Provide LEED Project Experience
- Promote LEED EB:O&M as a practical tool for improving building performance and indoor environmental quality

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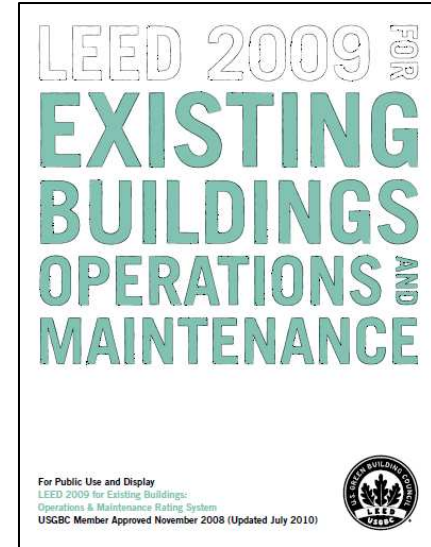
# Attendee Introductions

- Name
- Company or Affiliation?
- Why are you here?
- What aspect LEED Community Project are you interested in?



# Getting Ready for LEED EB: O&M

- Introductions
- Welcome to LEED EB: O&M
- Overview of CBEC LEED Community Project
- How it all worked
- Resources
- Expectations for volunteers & non-profit



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# Welcome to LEED EB:O&M!

- Why LEED EB: O+M?
- How is it different from other LEED systems?
- Basics of LEED EB: O+M

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The U.S. is home to more than  
**sixty billion** square feet of  
existing commercial buildings

\*\*\*\*\*

**2.2 billion** square feet  
currently LEED certified

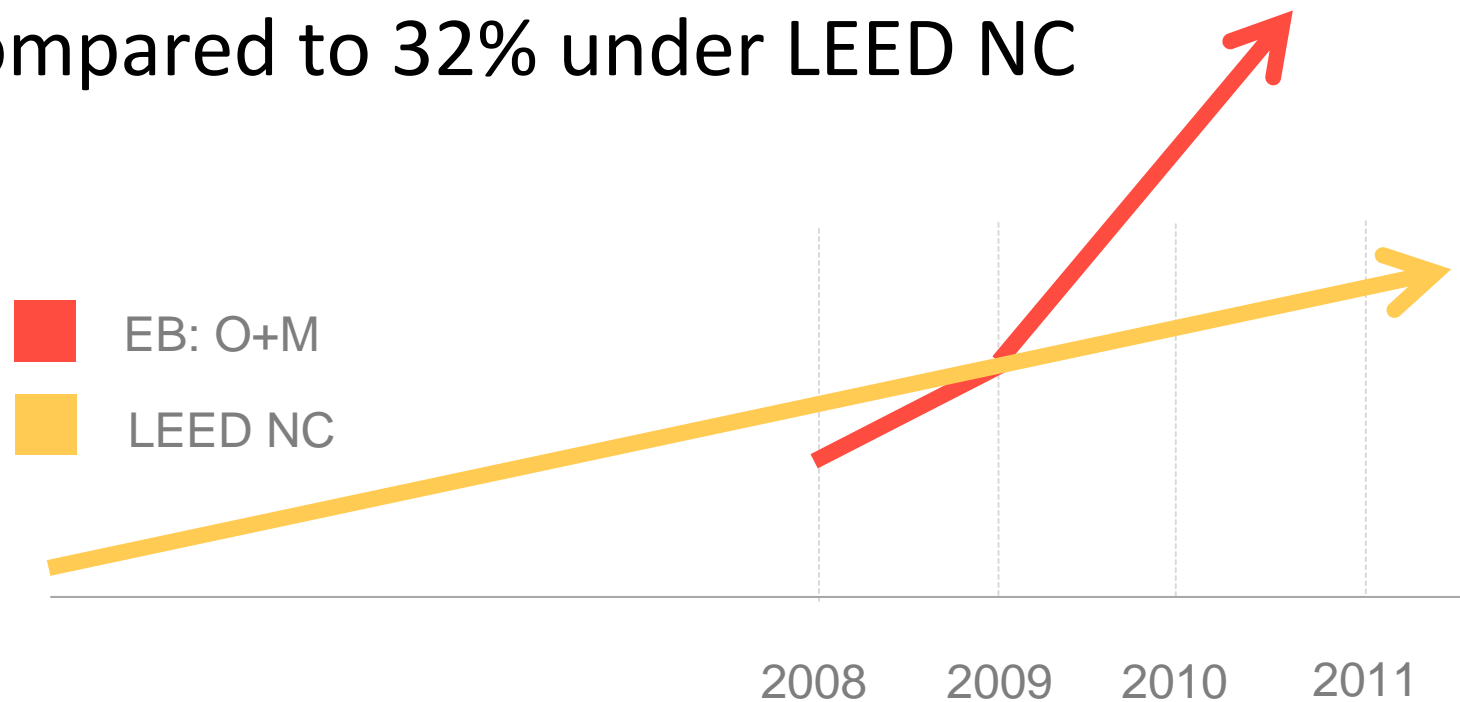
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# LEED EB:O&M continues to outpace

In 2012 LEED EB:O&M accounted for 53% of total square footage certified in “top ten LEED states” compared to 32% under LEED NC



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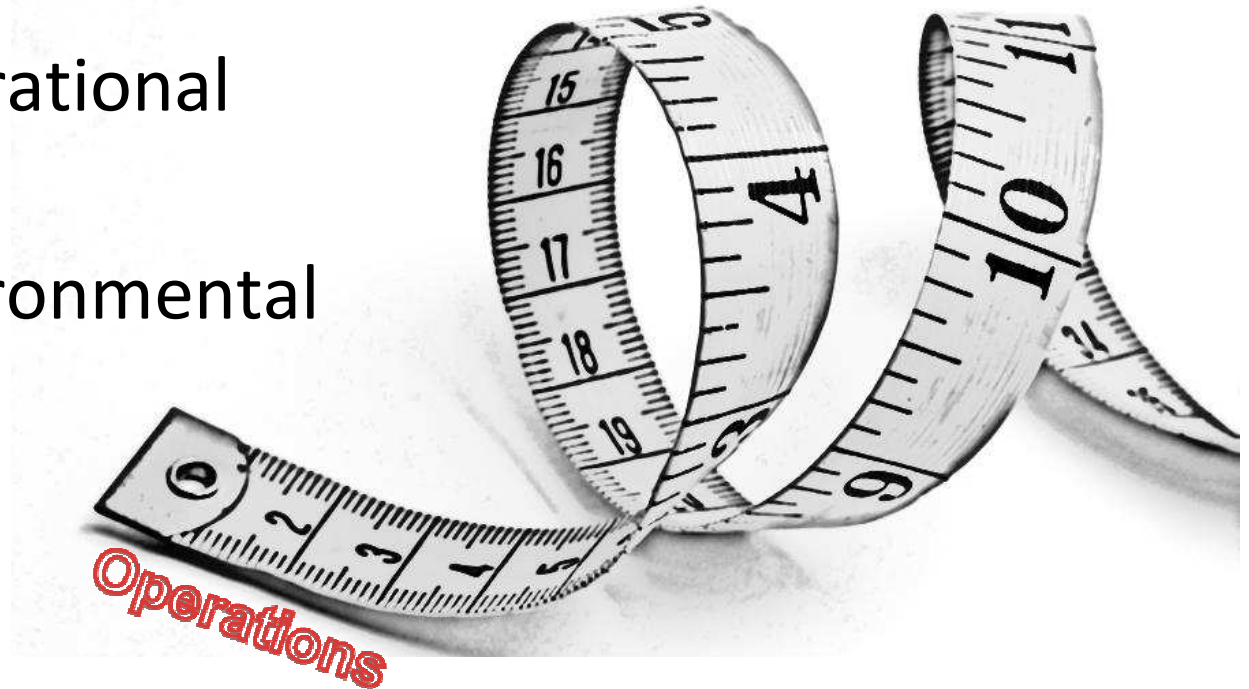


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# Why LEED EB: O&M?

- ❑ Helps building owners and operators document and measure operations
- ❑ Maximize operational efficiency
- ❑ Minimize environmental impacts



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# Why LEED EB: O&M?

- ❑ Even in buildings designed efficiently, operations can degrade over time



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# Toto, we're not in LEED NC land any more!



- ❑ Focus on operations and maintenance **NOT design and construction**
- ❑ Certification based on **actual performance** during 3 – 12 period
- ❑ Requires time investment of building operations staff

# Benefits of LEED EBOM

- ❑ Documentation of in-house intellectual capital.
- ❑ Driver for setting and measuring performance.
- ❑ Increases communication and collaboration
- ❑ Establishes strategies for managing whole-building operations.



# Policies and Plans

- Erosion & Sedimentation Policy
- Low-impact Site & Green Bldg Exterior Mgt Plan
- Integrated Pest Management Plan
- Storm Water Management Policy
- Building Operating and Maintenance Plan
- Sustainable Purchasing Policy
- Solid Waste Management Policy
- Indoor Air Quality Management Plan
- Green Cleaning Policy

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# Minimum Project Requirements

Federal, state  
and local  
environmental  
law/regulation  
compliance

Full  
Occupancy  
for at least 12  
continuous  
months

Applies to  
whole  
buildings



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# Overview of CBEC LEED Community Project

- Starts with Missouri Botanical Garden's Commitment to sustainability
- Commerce Bank Center for Science Education (aka CBEC) – already an efficient building
- 4<sup>th</sup> LEED certified project and 2<sup>nd</sup> LEED EB certification for the Garden
- Funding from Wells Fargo Green Team Grant Program

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# Overview of CBEC LEED Community Project

- Timeline & Process
  - Kick Off – October 2011
  - Performance Period – Roughly Feb – June, 2012
  - Submitted for prelim. review – July 20, 2012
  - Submitted for final review – October 25, 2012
  - LEED Silver Certification – December 14, 2012





# Overview of CBEC LEED Community Project



**YAY TEAM!**

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# How does it all fit together?



**Don't forget to CELEBRATE!**


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Evaluate:  
Building, Site  
LEED  
Credits

- ❑ Does project comply with Minimum Project Requirements?
- ❑ Thorough review of Reference Guide, Credit Templates, etc.

 **LEED for Existing Buildings**  
**IEQ CREDIT 3.1: GREEN CLEANING**  
**HIGH-PERFORMANCE CLEANING PROGRAM**  
Project # 1000004882 Education Center

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*All fields and uploads are required unless otherwise noted.*

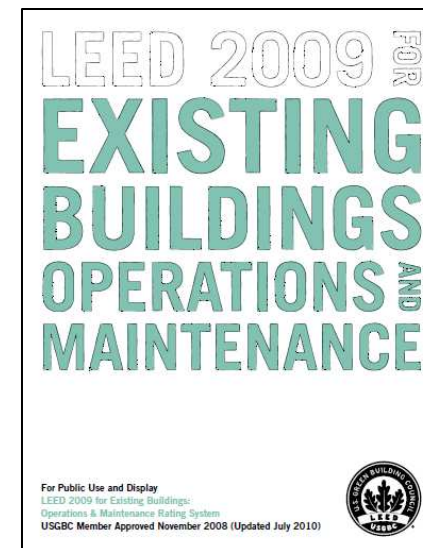
*TIP: Refer to the project's Green Cleaning Policy from IEQ Prerequisite 3, as that establishes the policies, goals, and practices that lead to achieving IEQ Credit 3.1.*

Performance period start:

Performance period end:

A high-performance cleaning program, supported by a green cleaning policy as required by IEQ Prerequisite 3, was in effect for the project building and associated grounds over the performance period.

Upload a copy of the compliant high-performance cleaning program that covers the project building and associated grounds.  Files: 0



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# Evaluate: Building, Site LEED Credits

- ❑ Start w baseline assessment
- ❑ Volunteers choose credits
- ❑ Set up LEED Online
- ❑ Assign Roles

**LEED for Existing Buildings: Operations & Maintenance  
Registered Building Checklist**

Project Name:  
Project Address:

Yes	?	No		Points
0	0	0	<b>Sustainable Sites</b>	<b>12 Points</b>
			Credit 1 <b>LEED Certified Design and Construction</b>	1
			Credit 2 <b>Building Exterior and Hardscape Management Plan</b>	1
			Credit 3 <b>Integrated Pest Management, Erosion Control, and Landscape Management Plan</b>	1
			Credit 4.1 <b>Alternative Commuting Transportation, 10%</b>	1
			Credit 4.2 <b>Alternative Commuting Transportation, 25%</b>	1
			Credit 4.3 <b>Alternative Commuting Transportation, 50%</b>	1
			Credit 4.4 <b>Alternative Commuting Transportation, 75% or greater</b>	1
			Credit 5 <b>Reduced Site Disturbance - Protect or Restore Open Space</b>	1
			Credit 6 <b>Stormwater Management</b>	1
			Credit 7.1 <b>Heat Island Reduction - Non-Roof</b>	1
			Credit 7.2 <b>Heat Island Reduction - Roof</b>	1
			Credit 8 <b>Light Pollution Reduction</b>	1
Y			<b>Water Efficiency</b>	<b>10 Points</b>
			Prereq 1 <b>Minimum Indoor Plumbing Fixture and Fitting Efficiency</b>	Required
			Credit 1.1 <b>Water Performance Measurement - whole building metering</b>	1
			Credit 1.2 <b>Water Performance Measurement - submetering</b>	1
			Credit 2.1 <b>Additional Indoor Plumbing Fixture and Fitting Efficiency, 10%</b>	1
			Credit 2.2 <b>Additional Indoor Plumbing Fixture and Fitting Efficiency, 20%</b>	1
			Credit 2.3 <b>Additional Indoor Plumbing Fixture and Fitting Efficiency, 30%</b>	1
			Credit 3.1 <b>Water Efficient Landscaping - Reduce Potable Water Use by 50%</b>	1
			Credit 3.2 <b>Water Efficient Landscaping - Reduce Potable Water Use by 75%</b>	1
			Credit 3.3 <b>Water Efficient Landscaping - Reduce Potable Water Use by 100%</b>	1
			Credit 4.1 <b>Cooling Tower Water Management - Chemical Management</b>	1
			Credit 4.2 <b>Cooling Tower Water Management - Non-Potable Water Source Use</b>	1
Y			<b>Energy &amp; Atmosphere</b>	<b>30 Points</b>
			Prereq 1 <b>Energy Efficiency Best Management Practices - Planning, Documentation, and Opportunity Assessment</b>	Required
			Prereq 2 <b>Minimum Energy Efficiency Performance</b>	Required
			Prereq 3 <b>Refrigerant Management - Ozone Protection</b>	Required
			Credit 1 <b>Optimize Energy Efficiency Performance</b>	15
			Credit 2.1 <b>Existing Building Commissioning - Investigation and Analysis</b>	2
			Credit 2.2 <b>Existing Building Commissioning - Implementation</b>	2
			Credit 2.3 <b>Existing Building Commissioning - Ongoing Commissioning</b>	2
			Credit 3.1 <b>Performance Measurement - Building Automation System</b>	1
			Credit 3.2 <b>Performance Measurement - System-Level Metering, 40%</b>	1
			Credit 3.3 <b>Performance Measurement - System-Level Metering, 80%</b>	1
			Credit 4.1 <b>Renewable Energy - On-site 3% / Off-site 25%</b>	1
			Credit 4.2 <b>Renewable Energy - On-site 6% / Off-site 50%</b>	1
			Credit 4.3 <b>Renewable Energy - On-site 9% / Off-site 75%</b>	1
			Credit 4.4 <b>Renewable Energy - On-site 12% / Off-site 100%</b>	1
			Credit 5 <b>Refrigerant Management</b>	1
			Credit 6 <b>Emissions Reduction Reporting</b>	1

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Evaluate:  
Building, Site  
LEED  
Credits

- ❑ Establish communication channels and guidelines between volunteers & building owner

### CBEC LESSONS LEARNED:

- *Importance of internal staff involvement*
- *Communication between volunteers & staff*
- *Education of building owner throughout project so results are on-going*

Readying:  
Policy and  
Program  
Development

- ❑ Can building meet LEED EB:O&M prerequisites?
- ❑ Is building an eligible ENERGY STAR type?

CBEC LESSON LEARNED:

*Place a greater emphasis on completing pre-requisites early in the project (certainly well before entering performance period)*

Readying:  
Policy and  
Program  
Development

- Start with the end in mind – let this inform your “work plan” for each credit
  - What are the time and cost investments?
  - Do we need “subject matter experts”?

CBEC LESSON LEARNED:

*Clarify expertise needed for each credit early on – ask for help if you need it!*

- Start with the end in mind –  
What's required for each  
credit?



## LEED for Existing Buildings IEQ CREDIT 3.1: GREEN CLEANING HIGH-PERFORMANCE CLEANING PROGRAM

Project # 1000004882 Education Center

*All fields and uploads are required unless otherwise noted.*

**TIP:** Refer to the project's Green Cleaning Policy from IEQ Prerequisite 3, as that establishes the policies, goals, and practices that lead to achieving IEQ Credit 3.1.

Performance period start:

Performance period end:

- A high-performance cleaning program, supported by a green cleaning policy as required by IEQ Prerequisite 3, was in effect for the project building and associated grounds over the performance period.

Upload a copy of the compliant high-performance cleaning program that covers the project building and associated grounds.

Upload

Files: 0



# Start with the end in mind – What’s required?



## IEQ CREDIT 2.1: OCCUPANT COMFORT- OCCUPANT SURVEY

All fields and uploads are required unless otherwise noted.

This static sample form has been modified for offline access. All sections of the form are visible. Sample forms are for reference only.

Performance period start:

Invalid Date range: The performance period must be between 89 and 731 days, and must end within 90 days of the overall project performance period given in the Project Information section.

Performance period end:

The project team conducted an occupant survey offered to all Regular Occupants of the project building.

The occupant survey began on:

Number of survey respondents:

Total number of regular occupants of the project building:

Percentage of the project building’s Regular Occupants who responded to the survey:  %

**Upload IEQc2.1-1.** Provide the survey language that addresses thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness, and other occupant comfort issues.

Upload

Files: 0

The survey content and method meets the minimum requirements described in the Reference Guide, including the requirement for survey responses to reflect a representative sample of regular occupants.

**REQUIRED SIGNATORY**

Initial here:

**FACILITY MANAGER/  
PROPERTY MANAGER**

Summarize the survey results and described any corrective actions taken to address any comfort issues identified through the

Readying:  
Policy and  
Program  
Development

## CBEC Lesson Learned:

*Understand from the outset what each credit requires & use a tracking tool!*

C	E	F	G	H	I	J	K	L	M	
MBG/CBEC LEED EBOM Certification	Points Attempted	P - P - P			Performance Period			LEED Online		
		Plan	Policy	Program		Date Started	Date Complet	Template Complete?	Signature Y/N/C	Y/N/C
		Y/N/C	Y/N/C	Y/N/C	Y/N					
Minimum Indoor Air Quality Performance	NA		Y	Y	N					document compliance w ASHRAE 62.1
Environmental Tobacco Smoke (ETS) Control	NA		uploaded		N				Y	
Green Cleaning Policy	NA	N	uploaded	N	Y	2/1/12			Fac Mgr	policy uploaded
Indoor Air Quality Best Management-IAQ Management Program	1	N	N	Y	Y				IAQ Mgr	IAQ Program / Audit Results / IAQ
Indoor Air Quality Best Management- Outdoor Air Delivery Monitoring	0	NA	NA	NA	NA				NA	
Indoor Air Quality Best Management- Increased Ventilation	0	N	N	Y (p1)	N				N	document 30% above ASHRAE 62.1
Indoor Air Quality Best Management- Reduced Particulates in Air Distribution	0	N	N	Y	Y				Fac Mgr	filter info / narrative
IAQ Management Plan-Facility Alterations and Additions	1	Y	N	N	Y				Fac Mgr	IAQ Construction Plan / copy of flt to upload a doc saying we had no
Occupant Comfort-Occupant Survey	1	N	N	N	Y				Fac Mgr	survey / narrative on summary of
Controllability of Systems-Lighting	2 (exempl)	N	N	N	N				N	info on workstations & lighting co
Occupancy Comfort- Thermal Comfort Monitoring	0								NA	
Daylight and Views	2	N	N	N	N				N	floorplans / daylight & views calc
Green Cleaning-High Performance Cleaning Program	1	N	N	Y	Y	2/1/12			N	HP Cleaning Program /
Green Cleaning-Custodial Effectiveness Assessment	2 (exempl)	N	N	Y (see 3.1)	Y	2/1/12			Fac Mgr	audit info and narrative on potent
Green Cleaning-Sustainable Cleaning Products, Materials Purchases	1	N	Y (p3, MRp1)	Y (see 3.1)	Y	2/1/12			N	fill out table / upload cleaning pro
Green Cleaning-Sustainable Cleaning Equipment	1	N	Y (p3, MRp1)	Y (see 3.1)	Y	1/3/12			Fac Mgr	fill out table / upload equipment i
Green Cleaning-Indoor Chemical and Pollutant Source Control	1	N	N	N	N				Fac Mgr	Floorplan / Narrative on cleaning j
Green Cleaning-Indoor Integrated pest Management	1	N	N	Y	Y	2/1/12			Fac Mgr	IPM Program / Pesticide Applicati

Readying:  
Policy and  
Program  
Development

- Start with the end in mind:  
What policy & procedure exist? What needs to be developed?

## CBEC LESSON LEARNED:

*LEEDUser is an  
INDESPENSIBLE tool.  
Use it early and often!*

The screenshot shows the LEEDUser website interface. At the top, there is a search bar and navigation links for 'Forum', 'LEED Credits', 'LEED Rating Systems', and 'Tipsheets'. Below this is a breadcrumb trail: 'RATING SYSTEM' > 'CREDIT CATEGORY' > 'CREDIT'. A prominent yellow callout box labeled 'STEP 1' says 'Choose a Rating System' and 'Click the green box above for a menu of choices'. The main content area is titled 'LEED Credit Browser' and includes a section 'Some Credits are Easy' with text: 'Some credits in the LEED 2009 rating systems are easy to achieve, and some are hard. Start by choosing a rating system, above.' and 'Let LEEDUser help you with for real world experience and answers about the certification process.' Below this are four columns: 'Sample Credits', 'Technical Help Needed?', 'Credit Too Expensive?', and 'Not Sure About Design Strategies?'. On the right side, there are sections for 'Free LEED Updates' (with social media icons for Twitter and Facebook) and 'Hot Topics in LEED' with a list of links: 'LEED Credit Q&A', 'Which LEED Rating System?', 'Costs of LEED Certification', 'Minimum Program Requirements', and 'Additional ETC'.

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Performance  
Period

By the time you reach the Performance Period, everything should be **smooooooth** sailing.

All the important work was completed during the last phase!



Performance  
Period

This is where the magic happens  
– **IMPLEMENT & MEASURE!**

Track the performance of your  
building against the policies and  
programs

**SSc4**: How many people used public transportation  
or alternative transportation? - 12 points!

**WEc1**: Water use of building and grounds – 1 point

**EAc1** – Energy used and renewable energy  
production – 13 points



Performance  
Period

This is where the magic happens  
– **IMPLEMENT & MEASURE!**

Track the performance of your building against the policies and programs.

**MRc 6&7** – Tracked diversion of ongoing consumables against waste audit – 3 points

**IEQc3.3** – Tracked purchase of green cleaning products against green cleaning and purchasing policies



Performance  
Period

Remember - LEED EB:O&M is not a snapshot. Behavior during Performance Period meant to be sustained.

**CBEC LESSON LEARNED:**

*Don't use the performance period as a deadline!*

## Document, Review and Certification



- Just sit down and do it – don't wait until you cannot find files and paperwork!
- Emphasize QA/QC of all details
- Confirm consistency in signatures and square footage across credits

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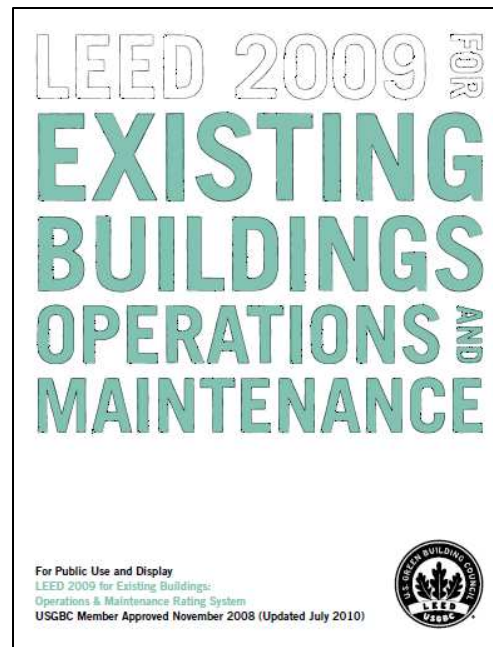


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# Resources

- Rating Systems (free on USGBC.org)
- Reference Guide (Chapter has copies to loan)
- Volunteers from CBEC project



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# Resources

- Credit Templates
- LEEDuser / LEED EBOM Stress Test
- Building Materials (“as builds”, Monsanto and CBEC documentation)



# Expectations: Building Owner

- Provide 1 years worth of utility data
- Provide any building operations manuals
- Provide any policies, guidance or practices
- Understand Minimum Project Requirements
- Be prepared to permanently implement new policies, guidelines, etc.
- Several internal staff will be key players
- Make yourself available to volunteers

# Expectations: Volunteers

- It's your job to get comfortable with LEED
- Regular meetings with full team or your credit team - and work in between meetings
- Track the time you spend on the project
- Ask for help if you need it
- Be respectful of building owner's time in gathering information and documentation for project

# Sneak Peak of Upcoming Sessions

- May 2 – Sustainable Sites & Water Efficiency
  - Hope Gribble, Kurt Thompson, Nick Bristow
- May 9 – Energy & Atmosphere
  - Gwenn Ivester & Deb Frank
- May 16 – Materials & Resources
  - Rene Dulle
- May 23 – Indoor Environmental Quality
  - Chris Laughman

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# Questions?

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