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Missouri Botanical Garden Commerce Bank Education Center

LEED: EXISTING BUILDINGS OPERATIONS & MAINTENANCE

Transforming the Built Environment



Missouri
Gateway
CHAPTER

Introductions

- Who are we?

- Deb Frank

- VP of Sustainability at Missouri Botanical Garden
 - Owner – CBEC
 - BA Pol Sci/Environmental Studies, MA Engineering and Policy, LEED AP BD&C
 - 30 years experience in energy and environmental issues, education and policy
 - Founding member of the U.S. Green Building Council-St. Louis Chapter and served as the Chapter Coordinator for five years.

- Gwenn Ivester

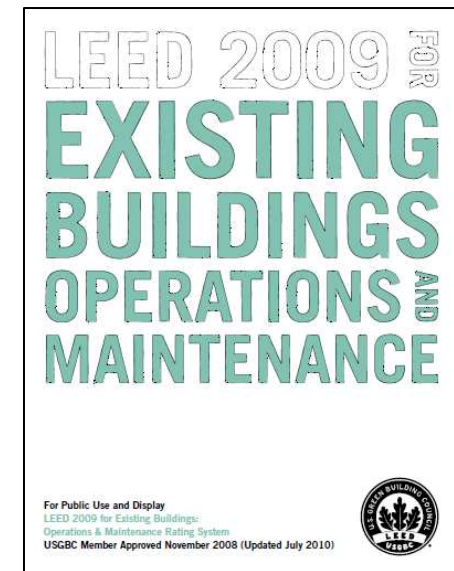
- Engineering project manager with Cassidy Turley at Edward Jones Home Office (St. Louis, MO & Tempe, AZ)
 - BS Electrical Engineering, MA Engineering Management
 - 7+ years experience working in critical building operations with emphasis in energy efficient operation

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- Category Overview | Energy & Atmosphere
- Credit X Credit Investigation
- Class Review



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ENERGY & ATMOSPHERE

CLASS OVERVIEW

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CATEGORY OVERVIEW

IS YOUR BUILDING QUALIFIED?

- Energy & Atmosphere Prerequisites (EAp)
 - ✓EAp1: Description of building HVAC systems including sequence of operations and preventative maintenance plan
 - ✓EAp2: Achieve an Energy Star performance rating of 69 or demonstrate an equivalent level of efficiency
 - ✓EAp3: Zero use of CFC-based refrigerants unless.....

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CATEGORY OVERVIEW

IS YOUR BUILDING QUALIFIED?

- **Energy & Atmosphere Credits (EAc)**
 - ✓ **EAc1** Optimized Energy Performance
 - **EAc2** Existing Building Commissioning
 - û EAc2.1: Investigation and Analysis, EAc2.2: Implementation, EAc2.2: Ongoing
 - û **EAc3** Performance Measurement
 - û EAc3.1: Building Automation, EAc3.2: System Level Metering
 - û **EAc4** Onsite and Offsite Renewal Energy
 - ✓ **EAc5** Enhanced Refrigerant Management
 - ✓ **EAc6** Emissions Reduction Reporting

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CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

- **Building Staff**
 - Building owner or representative
 - Lead maintenance technician(s) responsible for building HVAC and electrical equipment
- **Volunteer Staff**
 - HVAC technician, mechanical engineer
 - Electrical technician, electrical engineer
 - BAS/controls technician
 - familiar with energy calculations and cost estimations
 - Technical writing skills a plus
- **PE/RA for Energy Star certification**
 - EAp2 streamlined path



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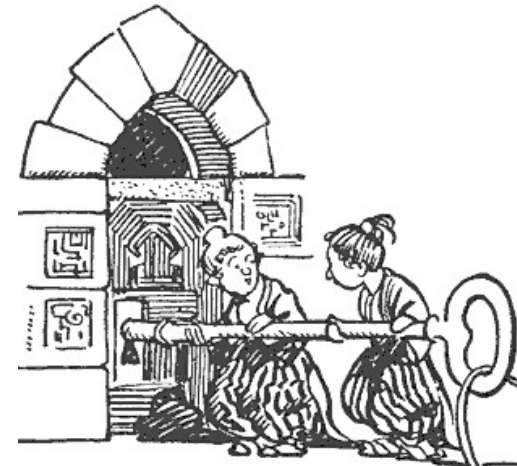


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CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

- **Building Staff**
 - Deborah Frank
 - Guy Dopmeyer (Lead Maintenance Technician)
- **Volunteer Staff**
 - Gwenn Ivester (EAp1, EAp2, EAc1)
 - Tim Michaels (EAp1)
 - Matt Steen (EAp2, EAc1, EAc6)
 - John Quinn (EAp3, EAc5)
 - Julie Coulter (Space Analysis)
 - Richard Ockers
- Polly Scott-Showalter
- John Weaver
- Lucy Mullis
- **PE/RA for Energy Star certification**
 - Mark Lopata



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CATEGORY OVERVIEW

Teamwork
Time
Money
LEED

RESOURCES. WHAT DID IT REALLY TAKE?

- Time
 - Conducting energy audits and building commissioning
 - Field research
 - Creating/updating documentation
 - Submitting in LEED Online
 - Technical Reviews & Resubmission



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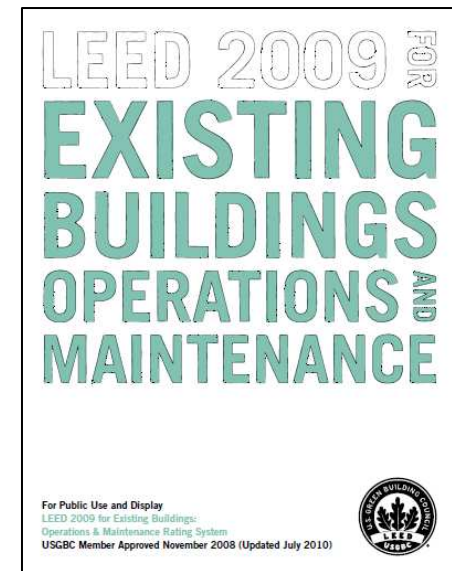
CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

- Money
 - Costs associated upgrading systems to improve efficiency (EAp2, EAc1)
 - Cost for installing additional equipment for sub-metering (EAc3.2)
 - Costs for purchasing renewable energy credits (EAc4)
 - Costs for professional services



- Credit Review
- The Process | How did/ would we do it?



ENERGY & ATMOSPHERE CREDIT ~~X~~ CREDIT INVESTIGATION

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1** Energy Efficiency Best Management Practices
 - Requisite Intent
 - To promote continuity of information to ensure that energy efficient operating strategies are maintained and provide a foundation for training and system analysis
 - Requirements
 - Building Operating Plan
 - Systems Narrative
 - Sequence of Operations
 - Preventative Maintenance Plan
 - Level 1 Energy Audit

Req



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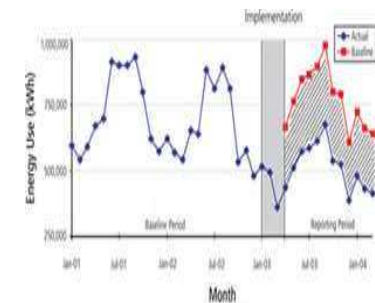


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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Baseline Assessment**
 - How extensive and up to date is your building documentation?
 - Space usage descriptions and space thermal settings
 - As-builts updated or redlined
 - OEM manuals
 - Known sequence of operations, access to BAS programming
 - Preventative maintenance documentation



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Data Collection & Monitoring**
 - As-built prints, compare to:
 - current building layout and space uses
 - Current systems used
 - Schedules and set points for HVAC and lighting equipment:
 - Temp, humidity, bldg. pressure, %OA, filters, lighting levels
 - 7 days a week
 - occupied vs. unoccupied
 - Seasonal variations



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Data Collection & Monitoring**
 - Sequence of operations
 - BAS programming or other method for maintaining building operation plan
 - Preventative maintenance records
 - Work order systems, completed work instructions, building maintenance log



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Data Collection & Monitoring**
 - Level 1 Energy Audit
 - Walk through building, familiarize yourself with construction, systems in place, and space types
 - Speak with owner and operators to determine if problems with operations exist or if the way building operates could affect efficiency.
 - Perform space function analysis
 - Identify major end use systems
 - Preliminary energy use analysis
 - Square footage of conditioned space
 - 12-36 months of utility bills (all sources)
 - Enter data into Energy Star Portfolio



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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Plans, Policies, & Procedures**
 - Building Operating Plan
 - May be different than original design or current documentation
 - BAS programming and set points are a good source
 - Preventative Maintenance Plan
 - Description, schedule, and records of completion



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Calculations**
 - Energy Use vs. Average Temp
 - Energy Use Index (kBTU/sq. ft)
 - Energy use breakdowns for major end use categories identified
 - Identify no cost-low cost changes and calculate energy or maintenance cost savings



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Data Submissions /Templates**
 - Mixture of:
 - Free form text boxes
 - Attachments of:
 - Documented building operating plan
 - Systems narrative
 - Documented preventative maintenance plan and schedule
 - Level 1 energy audit
 - EUI comparison and target index



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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp1 Lessons Learned, Review, Comments**
 - Don't over complicate or underestimate tasks
 - Make time to walk building multiple times
 - Set up a lot of trending at BAS that was not necessary at prerequisite stage
 - Doing calculations the way LEED Online suggests is usually the quickest and easiest way.



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HOW DID WE DO IT? WHAT DID WE DO?

- **EAp2** Minimum Energy Efficiency Performance
 - Requisite Intent
 - To establish a minimum level of operating energy efficiency performance relative to typical buildings of similar type to reduce environmental and economic impacts associated with excessive energy use
 - Requirements
 - Depends on eligibility of Energy Star Rating

Req



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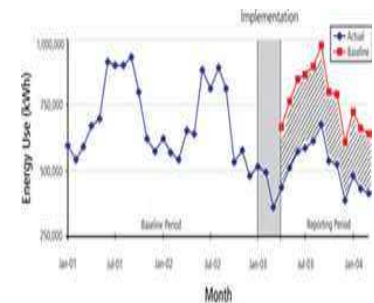


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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp2 Baseline Assessment**
 - Lower than 69, needs operational and/or equipment changes
 - Setups/setbacks, lighting upgrades, wider comfort range settings, chilled water/boiler temperature settings
 - Retrofit mechanical equipment, building automation upgrades, variable speed drives
 - Not a qualified building type?
 - Additional time and resources for full documentation path



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CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?



Credits
Process

Portfolio Manager - Building View

Space Use [Add Space](#)

Space Name	Space Type	Floor Area (Sq. Ft.)	% Floor Area	Alerts	
Sample Space Name	Office	15,000	100		Delete Space
Total		15,000	100		

Because more than 50% of your building is Office, your building is designated as Office within Portfolio Manager. This building may be eligible for a rating ([Click to learn more](#)). If you can see a rating for this building, please note that the rating takes into account all of the space types you have listed. If you cannot see a rating for this building, you can be compared to the national average for Office ([Click to learn more](#)).

Due to rounding, the % Floor Area Total may not always equal 100%.

Energy Meters [Add Meter](#) | [Update Multiple Meters](#) | [View All Meter Data in Excel](#)

Meter Name	Energy Type	Space(s)	Last Meter Entry (End Date)	Alerts	Read/Write Access	
Sample Meter	Electricity - Grid Purchase (kWh (thousand Watt-hours))	Entire Facility	05/31/2011	Data > 120 days old. more		Delete Meter

No Metering Configuration has been set for this facility. A metering configuration may be established to indicate whether the whole facility energy consumption or only a portion of that total is represented by these meters. ([Set Metering Configuration](#))

Water Meters [Add Meter](#) | [Update Multiple Meters](#) | [View All Meter Data in Excel](#)

Meter Name	Units	Use	Last Meter Entry (End Date)	Alerts	Read Write Access	
No Meter Defined						

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?



Credits
Process

Current Space Attribute Values What is this?			
Space Attribute	Space Attribute Value (Temporary values should only be used if an Actual value is not currently known) What is this?	Use Default Value	Units
Gross Floor Area (required for benchmarking)	15000	N/A	Sq. Ft.
Weekly operating hours (required for benchmarking)	55		Hours
Workers on Main Shift (required for benchmarking)	35		
Number of PCs (required for benchmarking)	32		
What percent of this space is air-conditioned? (required for benchmarking)	Less than 50%		
What percent of this space is heated? (required for benchmarking)	Less than 50%		

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HOW DID WE DO IT? WHAT DID WE DO?



Credits
Process

Edit Energy Use:

[Add Meter Entries](#)

Remove Entry	Start Date (MM/DD/YYYY)	End Date (MM/DD/YYYY)	Energy Use (kWh (thousand Watt-hours))	Cost - US Dollars (optional)
<input type="checkbox"/>	05/01/2011	05/31/2011	14854.00	\$ 200.00
<input type="checkbox"/>	04/01/2011	04/30/2011	14888.00	\$ 200.00
<input type="checkbox"/>	03/01/2011	03/31/2011	15025.00	\$ 200.00
<input type="checkbox"/>	02/01/2011	02/28/2011	15055.00	\$ 200.00
<input type="checkbox"/>	01/01/2011	01/31/2011	15110.00	\$ 200.00
<input type="checkbox"/>	12/01/2010	12/31/2010	15025.00	\$ 200.00
<input type="checkbox"/>	11/01/2010	11/30/2010	14925.00	\$ 200.00
<input type="checkbox"/>	10/01/2010	10/31/2010	14892.00	\$ 200.00
<input type="checkbox"/>	09/01/2010	09/30/2010	14823.00	\$ 200.00
<input type="checkbox"/>	08/01/2010	08/31/2010	15076.00	\$ 200.00
<input type="checkbox"/>	07/01/2010	07/31/2010	15035.00	\$ 200.00
<input type="checkbox"/>	06/01/2010	06/30/2010	14925.00	\$ 200.00

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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp2 Calculations**
 - If using Energy Star Portfolio
 - No calculations! Energy Star will calculate rating automatically from data entered.
 - If not eligible for Energy Star Rating
 - other prescribed benchmarking to prove 19% better than average energy efficiency when compared to similar building type



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CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- EAp2 Data Submissions /Templates

Current energy performance data for this credit is based on 12 continuous months of energy data for the project building as entered into, tracked, and reported by ENERGY STAR's Portfolio Manager tool.

Performance period start: Jul 1, 2011

Performance period end: Jun 30, 2012

Project building's site energy intensity:
(as provided by ENERGY STAR's Portfolio Manager tool) 43.7 kBTu /SF

Project building gross square footage: 57,716 sf

Calculated total annual purchased site energy usage: 2,522.1892 million BTu

- If Energy Star has been awarded submit documentation or...
- 12 months of utility bills for all energy sources and..
- Generate SEP from Energy Star Portfolio Manager
 - Monthly energy usage, source & site usage energy intensity, energy star performance rating, space usage types & actual operational variables, summary report



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HOW DID WE DO IT? WHAT DID WE DO?

- **EAp2 Lessons Learned, Review, Comments**
 - If using Energy Star Award, check dates of award vs. performance period end

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp3 Fundamental Refrigerant Management**
 - Requisite Intent
 - To reduce stratospheric ozone depletion
 - Requirements
 - Zero use of CFC based refrigerants in systems whose charge is greater than 0.5 pounds
 - Exception: Economic analysis shows that payback is greater than 10 years to upgrade refrigeration equipment
 - CFC based refrigerants leakage rate < 5% per year
 - Must also leak less than 30% of it's charge over its remaining life span

Req



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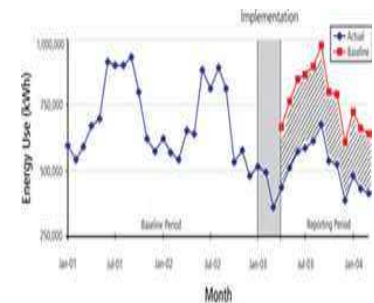


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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp3 Baseline Assessment**
 - What types of mechanical cooling does the building have? How old? In what condition?
 - The larger, older, poorly maintained refrigeration equipment will make EAc5 hard to achieve and may even affect EAp3



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp3 Data Collection & Monitoring**
 - Refrigerant equipment:
 - Type (ex. heat pump, chiller)
 - Location (ex. central plant, roof top unit)
 - Manufacturer (ex. Trane, York)
 - Model
 - Install date
 - Refrigerant type (ex. HCF's or HCFC's vs. CFC's)



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAp3 Calculations**

- If refrigerant type contains CFC's

- Verify refrigerant equipment charge is .5 lbs or less or...
- Prove that return on investment for replacing equipment with new, more efficient refrigerant equipment capable of using non CFC refrigerant is greater than 10 years.



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HOW DID WE DO IT? WHAT DID WE DO?

- EAp3 Data Submissions /Templates
 - Fill out refrigerant equipment table

HVAC&R Equipment Type	Equipment Location	Manufacturer Name	Model Number	Installation Date	Refrigerant Used
Packaged AC or Heat Pump	Central Plant	Trane	YSC072A4RLA0V	Dec 31, 2002	HCFC-22
Packaged AC or Heat Pump	Central Plant	Trane	YSC048A4RLA0Z	Dec 31, 2002	HCFC-22
Packaged AC or Heat Pump	Central Plant	Trane	YCD150D4LAAA	Dec 31, 2002	HCFC-22
Screw Chiller	Central Plant	Carrier	30HXC086	Dec 31, 2002	HFC-134a

- Full documentation for economic analysis of replacing CFC using refrigerant equipment



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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc1 Optimized Energy Performance** {1-18 pts}
 - Credit Intent
 - To achieve increasing levels of operating performance relative to typical buildings of similar type to reduce environmental and economic impacts associated with excessive energy use
 - Requirements
 - To achieve increasing levels of operating performance relative to typical buildings of similar type to reduce environmental and economic impacts associated with excessive energy use

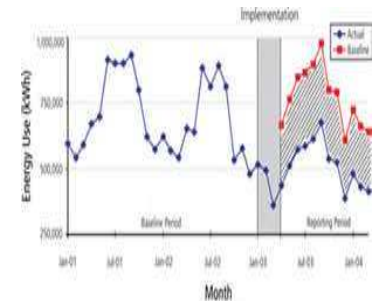
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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc1 Baseline Assessment**
 - Already calculated energy rating for EAp2
 - Either you need improvement to meet EAp2 or...
 - Need slight improvement to raise rating from 69 to 71 or...
 - Already at 71 or above



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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- EAc1 Data Submissions /Templates
 - None, documentation submitted for EAp2 will automatically update this form

	Case 1	Case 2 Option 1	Case 2 Option 2A	Case 2 Option 2B	Case 2 Option 2C
EAp2 Compliance	69	19	19	19	19
1	71	21	n/a	21	21
2	73	23	n/a	23	23
3	74	24	n/a	24	24
4	75	25	n/a	25	25
5	76	26	n/a	26	26
6	77	27	n/a	27	27
7	78	28	n/a	28	28
8	79	29	n/a	29	29
9	80	30	n/a	30+	30
10	81	31	n/a	n/a	31
11	82	32	n/a	n/a	32
12	83	33	n/a	n/a	33
13	85	35	n/a	n/a	35
14	87	37	n/a	n/a	37
15	89	39	n/a	n/a	39
16	91	41	n/a	n/a	41
17	93	43	n/a	n/a	43
18	95	45	n/a	n/a	45
Exemplary Performance	97+	47+	n/a	n/a	47+



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HOW DID WE DO IT? WHAT DID WE DO?

- **EAc1 Lessons Learned, Review, Comments**
 - Documentation must be properly submitted for EAp1 before this form will update correctly
 - Form may need to be saved and marked complete before scorecard will show appropriate points attempted/earned.

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc2.1** EB Commissioning Investigation & Analysis
{2 pts}
 - Credit Intent
 - Through a systemic process to develop an understanding of the operation of the building's major energy using systems, options for optimizing energy performance and a plan to achieve energy savings
 - Reasons for NOT Pursuing:
 - Time constraints for additional detail and calculations to the level I audit

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc2.2 EB Commissioning Implementation** {2 pts}
 - Credit Intent & Requirements:
 - To implement minor improvements and identify planned capital projects to ensure that the buildings major energy-using systems are repaired, operated and maintained effectively to optimize energy performance
 - Reasons for NOT Pursuing:
 - Time constraints
 - Creation & documentation of formal training plan for building personnel
 - Requirement that all no cost/ low cost improvements are made before end of performance period



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HOW DID WE DO IT? WHAT DID WE DO?

- **EAc2.3 EB Commissioning - Ongoing** {2 pts}
 - Credit Intent & Requirements:
 - To use commissioning to address changes in facility occupancy, use, maintenance and repair. Make periodic adjustments and reviews of building operating systems and procedures essential for optimal energy efficiency
 - Reasons for NOT Pursuing:
 - Time constraints
 - Creation of documentation system (ex. ISO 9001)
 - Creation of commissioning cycle for all building systems, complete ½ the scope of work before submitting LEED application

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc3.1 Performance Measurement – Building Automation System** {1 pt}
 - Credit Intent & Requirements:
 - To provide information to support the ongoing accountability and optimization of building energy performance and identify opportunities for additional energy saving investments
 - Reasons for NOT Pursuing:
 - Simply having a BAS system is not enough
 - BAS maintenance program must be comprehensive and include calibration of sensors
 - Data collection verifying that the BAS programming is operating the system as desired per the building operating plan and sequence of operations



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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc3.2 Performance Measurement – System Level Metering** {1-2 pts}
 - Credit Intent & Requirements:
 - To provide accurate energy use information to support energy management and identify opportunities for additional energy saving improvements
 - Reasons for NOT Pursuing:
 - Cost to implement
 - Meters
 - Installation
 - Connection to BAS

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc4 Onsite & Offsite Renewable Energy** {1-6 pts}
 - Credit Intent & Requirements:
 - To encourage and recognize increasing levels of on and off site renewable energy to reduce environmental and economic impacts associated with fossil fuel energy use
 - Reasons for NOT Pursuing:
 - Sold energy credits for PV system
 - Did not want to spend organization funds to buy credits unless absolutely necessary

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc5 Enhanced Refrigerant Management** {1 pt}
 - Credit Intent
 - To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global climate change
 - Requirements
 - Do not use refrigerants in base building HVAC & R systems or...
 - $LCGWP + LCODP \times 10^5 \leq 100$

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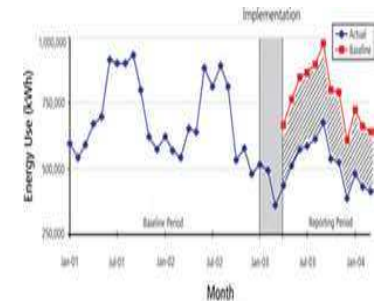


CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc5 Baseline Assessment**

- Naturally ventilated buildings with no active cooling systems automatically achieve this credit
- Using only natural refrigerants? (ammonia, CO₂, water)
- Using refrigerants with low ODP and GWP? (HFC-134a)



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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc5 Data Collection & Monitoring**
 - From refrigerant manufacturer's data
 - ODP_r = ozone depletion potential
 - GWPr = global warming potential
 - From refrigerant equipment manufacturer's data
 - Mr = end of life refrigerant loss
 - Rc = unit's required refrigerant charge
 - Life = equipment life (default)
 - From maintenance records
 - Lr = refrigerant leakage rate



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HOW DID WE DO IT? WHAT DID WE DO?

- EAc5 Calculations

- Global Warming Potential component + Ozone Depletion component ≤ 100
- LEED Online form calculates for you from data entered in chart



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HOW DID WE DO IT? WHAT DID WE DO?

- EAc5 Data Submissions /Templates

HVAC&R Equipment Type	N	Q (ton s)	Refrigerant	GWPr	ODPr	Rc (lb/ ton)	Life (yrs)	Lr (%)	Mr (%)	LCGWP	LCODP x10^5	Refrigerant Impact per ton	Refrigerant Impact Total
Packaged AC or Heat Pump	1	6	R-22	1780	.04	1.18	15	2	10	56	126	182	1,092
Packaged AC or Heat Pump	1	4	R-22	1780	.04	.95	15	2	10	45	101	146	584
Packaged AC or Heat Pump	1	12.5	R-22	1780	.04	1.5	15	2	10	71	160	231	2,888
Screw Chiller	1	80	R-134a	1320	0.00001	1.89	25	2	10	60	0	60	4,800
Total:		102.5										91	9,364



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HOW DID WE DO IT? WHAT DID WE DO?

- EAc5 Lessons Learned, Review, Comments
 - Need mechanical engineer to sign off on data and calculations
 - Mechanical engineer must be identified in LEED Online as a signatory and must log in under own login to sign initials.

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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc6 Emissions Reduction Reporting** {1 pt}
 - Credit Intent
 - To document the emissions reduction benefits of building efficiency measures
 - Requirements
 - Calculate and track the GHG emissions generated by the operation of the facility
 - Compare those emissions with past levels or national medians
 - Formally participate in third-party reporting or certifying programs or use technically sound independent calculations

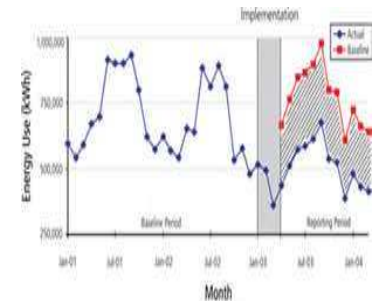
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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc6 Baseline Assessment**
 - No minimum requirement, no requirement to reduce during performance period
 - Goal is simply to promote calculating and tracking of GHG emissions for awareness



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CREDITXCREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc6 Data Collection & Monitoring**
 - Annual energy use of all energy sources
 - Regional contribution to GHG emissions from utility providers

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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- EAc6 Calculations
 - Convert annual energy usage into GHG emissions using Energy Star or other acceptable third party or protocol



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- **EAc6 Data Submissions /Templates**
 - Provide a summary of actions relating to building energy emissions reductions measures and estimate the relative contribution of each action (Very general)
 - SEP from Energy Star (needs PE validation) or other third party reporting/certifying or...
 - Documentation from other protocol including calculations and protocol language



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CREDITX CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

- Prior to Performance Period
 - EA Category Requirements and LEED Online Review
 - Set Up Project Management - e.g. Gantt charts (timeline), checklists, assign responsibilities
 - Level 1 energy audit & other GAP Analysis
 - EAp1 documentation rough drafts



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HOW DID WE DO IT? WHAT DID WE DO?

- Prior to Performance Period (cont'd)
 - If purchasing offsite renewable energy credits (REC), sign 2 year minimum contract prior to performance period start.
 - Develop ongoing commissioning plan
- Performance Period Schedule (3 -24 months*)
 - If pursuing EAc3.2 and need to install meters, do so before or as early in the performance period as possible



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HOW DID WE DO IT? WHAT DID WE DO?

- Performance Period Schedule (cont'd)
 - Level II Energy Audit
 - Documentation of refrigerant uses
 - Implementation of Low-Cost No Cost Options
 - Analyze effectiveness of changes based on energy usage reductions and ROI
 - Develop and implement training programs
 - Implement 50% of ongoing commissioning before submitting application



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HOW DID WE DO IT? WHAT DID WE DO?

- Performance Period Schedule (cont'd)
 - Document preventative maintenance completed during performance period and refrigerant charges performed annually
 - Calculate GHG emissions and other credit calculations required from data collected
 - Refine/update documents for EAp1 (seq. of ops, basis of design, energy usage breakdowns, etc.)



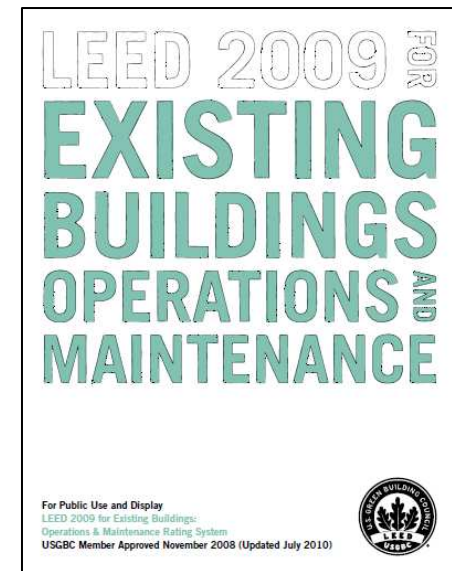
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- Q & A
- General Project Review



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ENERGY & ATMOSPHERE

CLASS REVIEW

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Q & A

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PROJECT REVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

- Expectations
 - Group Meetings and Credit Team Meetings
 - Individual work on each credit
 - Team work days
 - "In for the long haul"
- Team Organization
 - Category Captain (act as project manager)
 - Credit Owners



PROJECT REVIEW

Teamwork
Time
Money
LEED

RESOURCES. WHAT DID IT REALLY TAKE?

- LEED Specific
 - LEEDUSER.COM
 - LEED Online (can't stress enough)
 - LEED/GBCI Website and Forums
 - LEED AP/GA with specific knowledge of EB: O & M



HELP CENTER

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LEED: EXISTING BUILDINGS OPERATIONS & MAINTENANCE

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