

Benchmarking Blitz

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Jeff Kelley
Business Development Lead

Energy 101

- How do you convert utility billing to energy?
 - 1 kilowatt hour = 3,412 BTUs at the site; source energy is higher for electricity, depending on the fuel source used in generation
 - 1 therm = 100,000 BTUs of natural gas
- One BTU heats one pound of water one degree Fahrenheit



Energy 101

- Energy benchmarking is annual kBTU/square foot
 - kBTU = thousands of BTUs
- All the units (gas, electric) are converted to kBTUs

Missouri Botanical Garden Case Study



- Raw kBTU/square foot
 - Commerce Bank Education Center 48.0*
 - Lehman Administration Building 58.5
 - Ridgway Main Campus 136.7
 - Monsanto Plant Sciences Center 217.5
- *Energy Star Building

Commerce Bank Education Center

ENERGY STAR Score
(1-100)

Current Score: 88

Baseline Score: 84

Metrics Summary

[Change Time Period](#)

Metric	Baseline (May 2012)	Current (Feb 2015)	Change
ENERGY STAR score (1-100)	84	88	4(4.8%)
Source EUI (kBtu/ft ²)	115.2	107.2	-8.0(-6.9%)
Site EUI (kBtu/ft ²)	45.7	48.0	2.3(5.0%)
Energy Cost (\$)	46,926.49	58,409.83	11483.34 (24.5%)
Total GHG Emissions (Metric Tons CO ₂ e)	514.3	465.5	-48.8(-9.5%)

Lehmann Building

ENERGY STAR Score
(1-100)

Current Score: 46

Baseline Score: 48

Metrics Summary

[Change Time Period](#)

Metric	Baseline (Jun 2014)	Current (Jul 2015)	Change
ENERGY STAR score (1-100)	48	46	-2(-4.2%)
Source EUI (kBtu/ft ²)	184.9	183.6	-1.3(-0.7%)
Site EUI (kBtu/ft ²)	58.9	58.5	-0.4(-0.7%)
Energy Cost (\$)	81,125.72	82,850.63	1724.91 (2.1%)
Total GHG Emissions (Metric Tons CO ₂ e)	745.1	739.7	-5.4(-0.7%)

Main Campus

- Contains Ridgway and many other buildings
- No score due to mix usages, but benchmarking is possible

Metrics Summary		Change Time Period	
Metric	Baseline (Jun 2014)	Current (May 2015)	Change
ENERGY STAR score (1-100)	<u>Not Available</u>	<u>Not Available</u>	N/A
Source EUI (kBtu/ft ²)	308.8	252.4	-56.4(-18.3%)
Site EUI (kBtu/ft ²)	191.0	136.7	-54.3(-28.4%)
Energy Cost (\$)	414,237.36	365,192.59	-49044.77 (-11.8%)
Total GHG Emissions (Metric Tons CO ₂ e)	4,002.5	3,434.4	-568.1(-14.2%)

Monsanto Building



- Contains herbarium, relatively efficient compared to similar properties
- Energy intensive due to mission of the property

Metrics Summary		Change Time Period	
Metric	Baseline (Jun 2014)	Current (Jul 2015)	Change
ENERGY STAR score (1-100)	Not Available	Not Available	N/A
Source EUI (kBtu/ft ²)	546.4	581.1	34.7(6.4%)
Site EUI (kBtu/ft ²)	204.1	217.5	13.4(6.6%)
Energy Cost (\$)	308,592.36	331,638.26	23045.90 (7.5%)
Total GHG Emissions (Metric Tons CO ₂ e)	3,186.3	3,387.1	200.8(6.3%)

Low Score? High kBTU/sq ft?

Example Efficiency Improvements

- Lighting
 - Replace HID with LED
 - Move toward sensors or training
 - Replace fluorescent/halogen/incandescent with LED
- HVAC
 - Controls
 - Set back
 - High efficiency natural gas equipment
- Water Heating
 - Low flow, correct size, on demand
 - Insulation



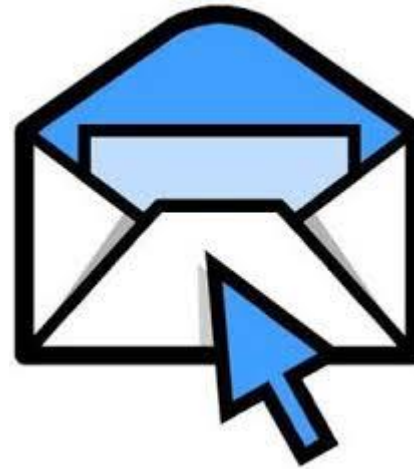
BizSavers Program

Wrap-Up



- All applications and completion paperwork due by **November 30, 2015**
- New program under consideration

Get Started Benchmarking!



1.866.941.7299

BIZeiciency@ameren.com