LEED Beyond Occupancy

April 27, 2012

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Vice President & Director of Design

Innovative Design

USGBC NC Triangle Chapter

Agenda

1. Survey
2. LEED Building Performance
3. Common Issues
4. What Owners Should Know
5. Q&A

Annual Sponsors

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Balfour Beatty Construction

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Bronze Sponsors

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CaraGreen Sustainable Architectural Materials

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NC TRIANGLE CHAPTER

About the Organization

Mission:

To transform the way buildings and communities are designed, built and utilized, enabling an environmentally and socially responsible, healthy, and prosperous environment for current and future generations in central and eastern North Carolina.

Vision:

Buildings and communities will regenerate and sustain the health and vitality of all life within a generation.

NC TRIANGLE CHAPTER

About the Organization

Type	Quantity
Chapter Members	~350
USGBC National Members in Territory	~175
Active Chapter Volunteers	100
Chapter Committees	9
Annual Budget	~$160,000
Board of Directors	15
Staff	1.5
How often does your board meet?	Monthly
How often do your committees meet?	Monthly (typically)

NC TRIANGLE CHAPTER

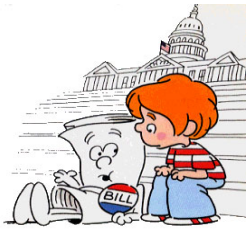
USGBC/LEED in NC

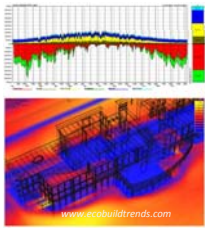
Type	Quantity
LEED Certified Projects in NC	~270
LEED Registered Projects in NC	~744
LEED APs in NC	~4375
Chapters (Triangle, Triad, Charlotte)	3
Branches	

NC TRIANGLE CHAPTER

2011-2013 Strategic Plan

- Education
- Public Policies on Green Buildings
- Social Equity
- Building Performance Initiative
- Organizational Excellence





NC TRIANGLE CHAPTER

Building Performance

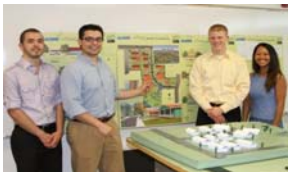
Five Major Areas of Building Performance Within the LEED Program:

- Sustainable Site Development
- Water Savings
- Energy Efficiency
- Materials Selection
- Indoor Environmental Quality

NC TRIANGLE CHAPTER

Talk-n-Walk:
The Art of Sustainability
Sponsored by Lappas + Havener, PA
Wednesday, April 25th - 4:30pm - 6:30pm
NC Museum of Art
2110 Blue Ridge Road
Raleigh, NC 27607

Generation Green: Celebrating a New Generation of Builders
Saturday, April 28th – 4:30 pm
N.C. Museum of Natural Sciences
11 West Jones Street
Raleigh, NC 27601



Membership Luncheon w/ Governor Perdue
Thursday, May 24th- 11am- 2pm
Radisson Hotel RTP
150 Park Drive
Durham, NC 27709

NC TRIANGLE CHAPTER

Survey

Do you have LEED certified buildings on your campus?

Do you manage LEED certified buildings?

Survey

As a FM, when do you begin participating in a new project?

a. At the beginning of the design
b. At the construction document phase
c. During the construction – usually during TAB/Commissioning
d. After project completion

Survey

As a FM, do you know how much of energy your buildings consume?

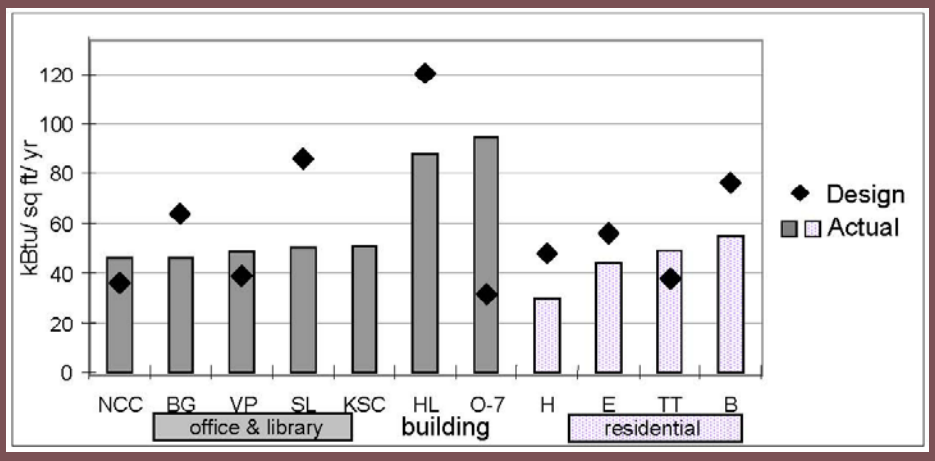
As a FM, do you know how much of energy your buildings are designed to consume?

LEED Building Performance

USGBC Cascadia, 2006

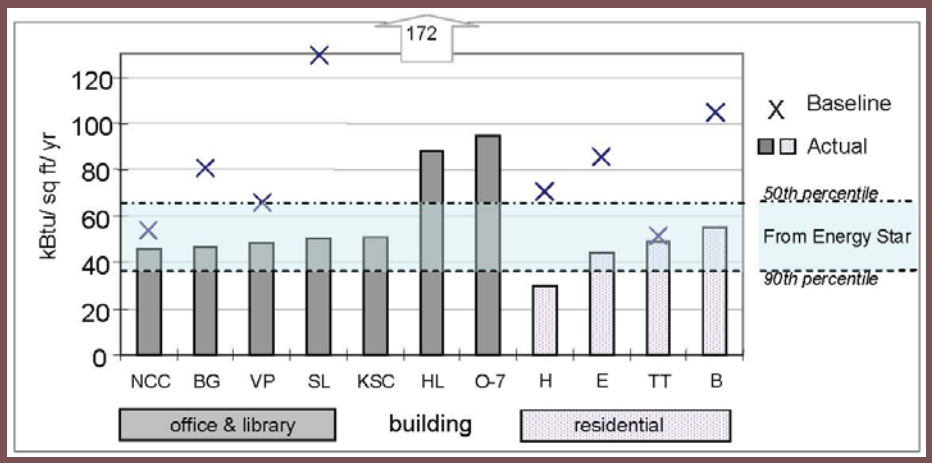
- 11 LEED Certified Buildings
- Actual compared to Design
- Actual compared to Baseline
- Actual compared to Energy Star Median

LEED Building Performance



Source: USGBC Cascadia, 2006

LEED Building Performance



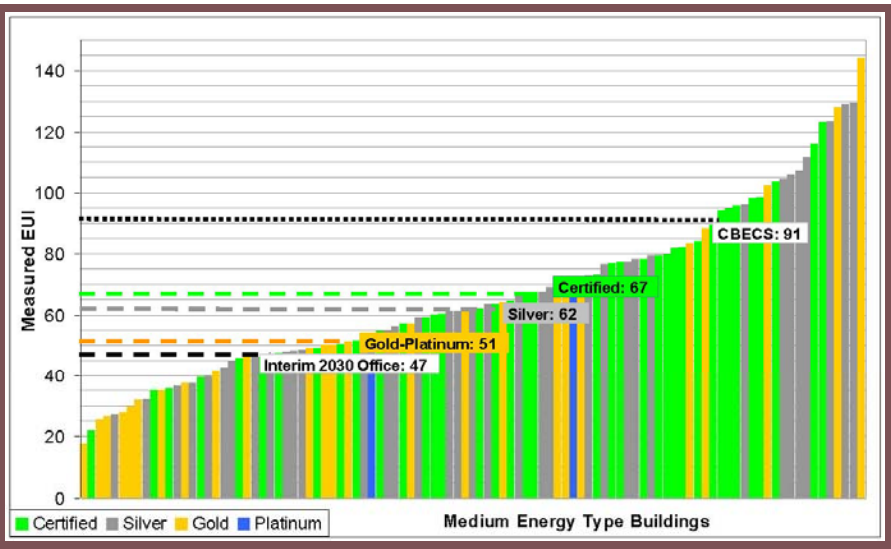
Source: USGBC Cascadia, 2006

LEED Building Performance

New Building Institute Study, 2008

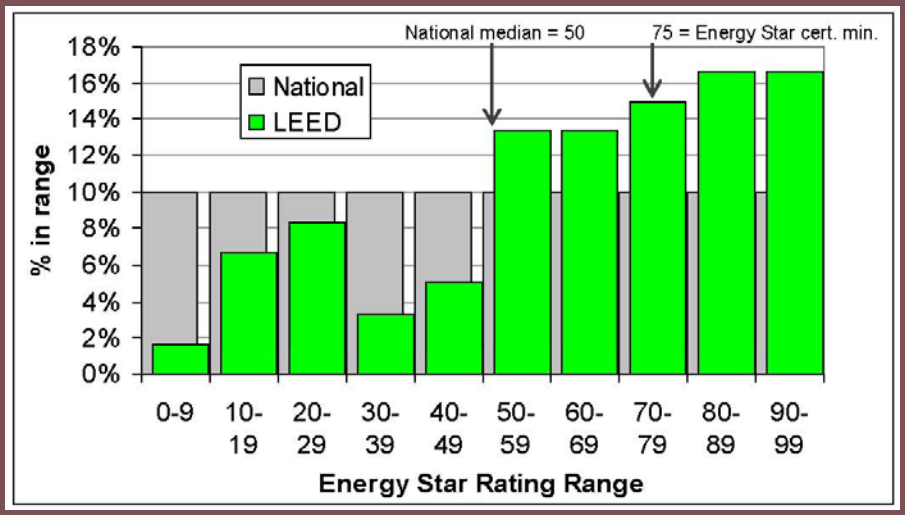
- 121 LEED Certified Buildings
- EUI comparisons to CBECS
- EUI comparisons to Energy Star
- Actual vs. modeled energy use comparison

LEED Building Performance



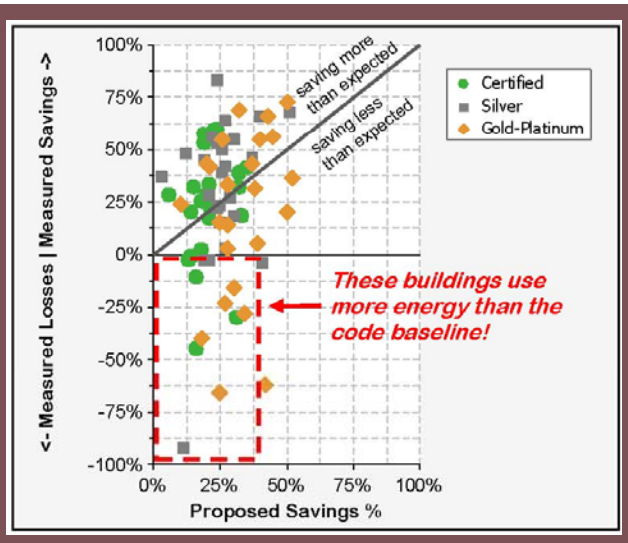
Source: New Building Institute Study, 2008

LEED Building Performance



Source: New Building Institute Study, 2008

LEED Building Performance



Source: New Building Institute Study, 2008

LEED Building Performance

GSA, 2009

- 12 LEED Certified Buildings
- EUI comparisons to CBECS
- EUI comparisons to Energy Star

LEED Building Performance

26%
Less energy use
(65 kBtu/sf/yr vs. 88 kBtu/sf/yr).

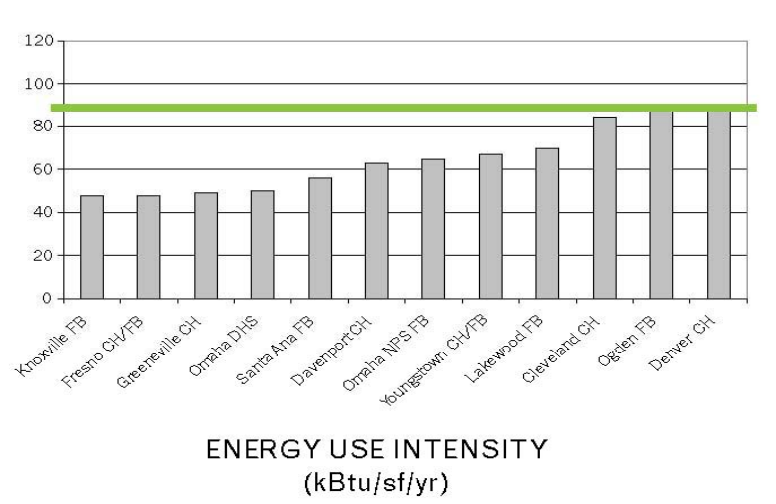
13%
Lower aggregate maintenance costs ($2.88/sf vs. $3.30/sf)

27%
Higher occupant satisfaction

33%
Fewer CO_2 emissions
(19lbs/sf/yr vs. 29lbs/sf/yr)

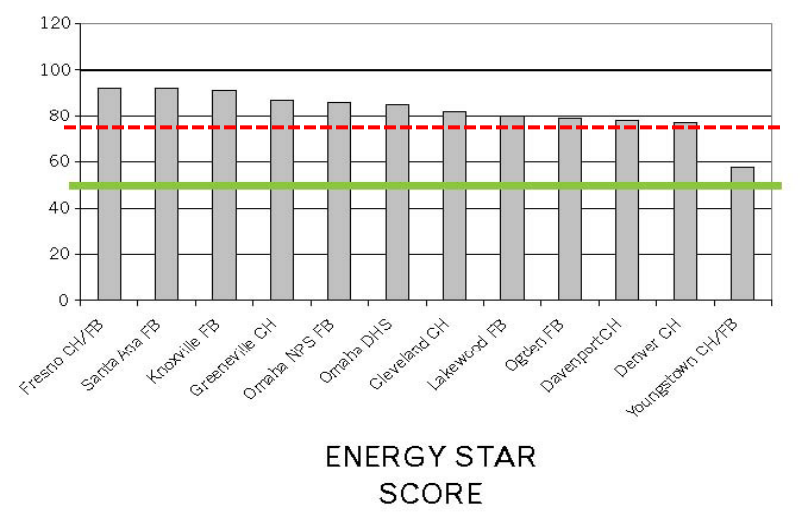
Source: GSA, 2008

LEED Building Performance



Source: GSA, 2008

LEED Building Performance



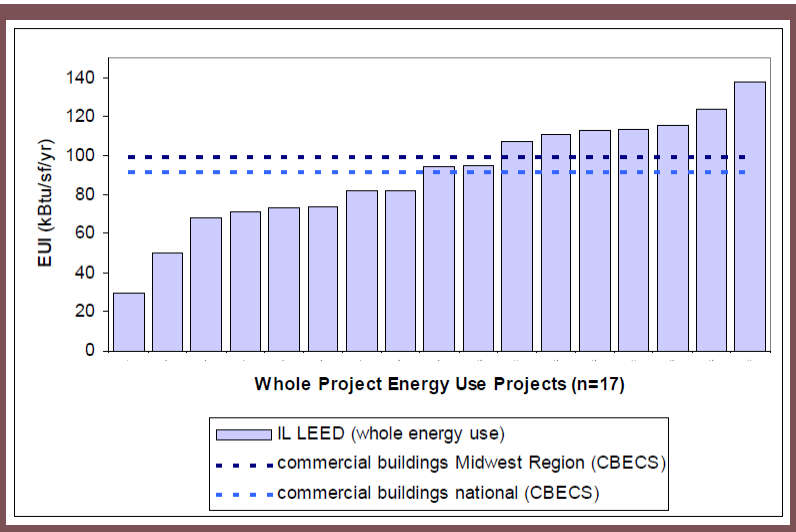
Source: GSA, 2008

LEED Building Performance

USGBC Chicago, 2009

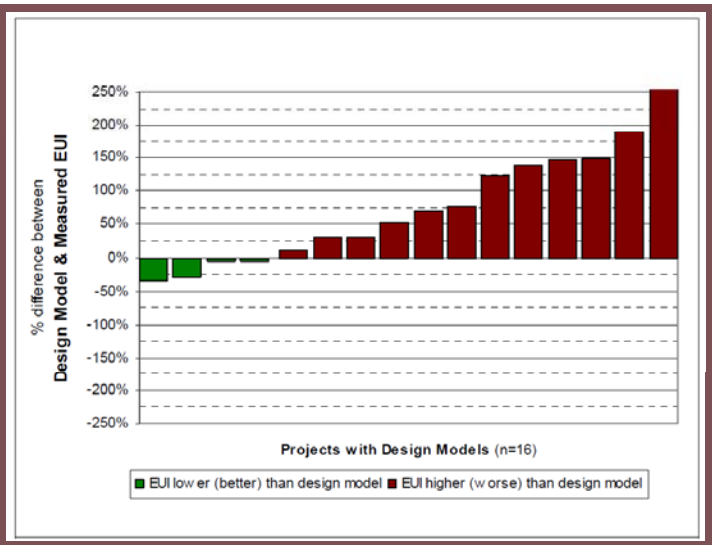
- 25 LEED Certified Buildings
- EUI comparisons to CBECS
- EUI comparisons to Energy Star

LEED Building Performance



Source: USGBC Chicago, 2009

LEED Building Performance



Source: USGBC Chicago, 2009

LEED Building Performance

USGBC NC Triangle, 2012

- 25 LEED certified buildings were contacted
- 12 buildings are analyzed
- Various project types
  - Hi-Ed = 5
  - Office = 2
  - Public Assembly = 1
  - Retail = 1
  - Education = 1
  - Data Center = 1
  - Mixed other = 1

LEED Building Performance

USGBC NC Triangle, 2012

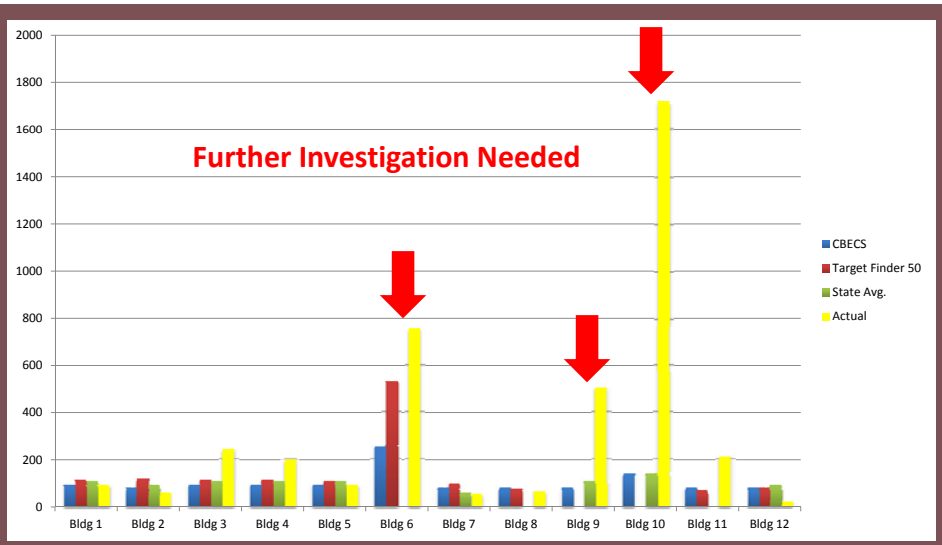
- EUI comparison to CBECS
- EUI comparison to Energy Star
- EUI comparison to State Owned Buildings
- Actual vs. modeled (if model is provided)
- Water usage analysis

LEED Building Performance

USGBC NC Triangle, 2012

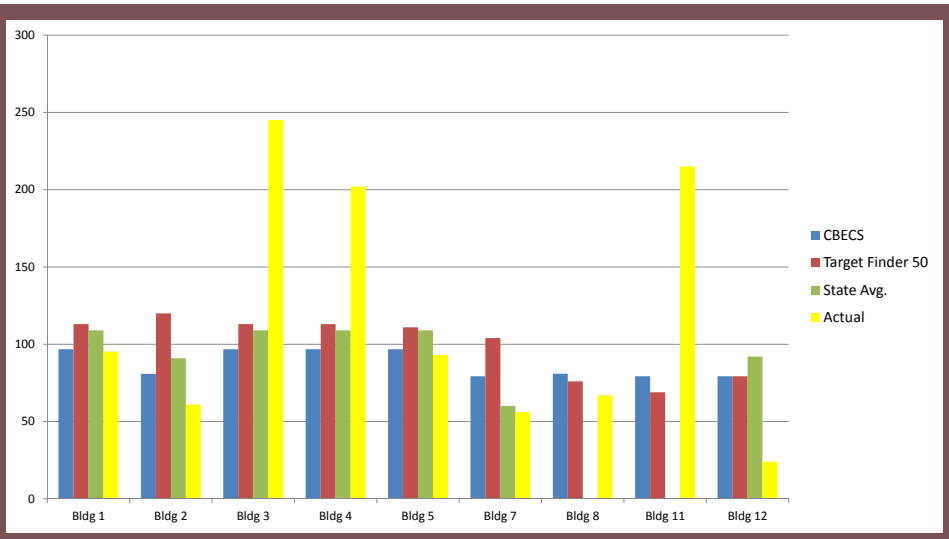
- 12 Buildings are within CBECS categories.
- 10 Buildings are within EPA Target Finder categories.
- 9 Buildings are within State's energy data.
- 1 Building provided modeled energy data.
- Water comparison baseline is not available.

LEED Building Performance



Source: USGBC NC Triangle Chapter, 2012

LEED Building Performance



Source: USGBC NC Triangle Chapter, 2012

LEED Building Performance

Average

- Actual compared to CBECS = 32% more
- Actual compared to Target Finder 50 = 22% more
- Actual compared to State Avg. = 9.9% more

Source: USGBC NC Triangle Chapter, 2012

LEED Building Performance

SB 668

- Passed in 2007
- Been effective since summer 2008
- 30% more efficient than ASHRAE 90.1-2004 (could be approx. 50% less than CBECS)
- Not many buildings complete and been in operation

Source: USGBC NC Triangle Chapter, 2012

LEED Building Performance

Phase I Wrap-Up

- Will deliver individual project report to owners (confidential)
- Will publish overall analysis report in May (open)
- Will contact owners to recruit Phase II participants
- Will call for sponsorship for Phase II (goal = $30K-45K)

Source: USGBC NC Triangle Chapter, 2012

LEED Building Performance

Phase II Study

- Teamed up with NCSU professor and grad students
- Will select 2-5 projects
- Will install monitoring devices and track records for months
- Will analyze data and possibly recalibrate modeling
- Will recommend improvement strategies
- Will publish

Source: USGBC NC Triangle Chapter, 2012

LEED Building Performance

Common Findings

- Energy saving = 15-30% to CBECS
- BUT, not as great as anticipated.
- No co-relation between LEED level and energy saving
- Energy saving relative to EAc1 points.
- Modeling and actual are very inconsistent.
- Project types with high process load are problematic.

Common Issues

Early Involvement

- Understanding design intent for good maintenance
- Maintenance concern in design
- Investigating energy efficiency options together – plug load, operation sequence, etc.

Common Issues

Knowing what to expect

- Goal setting at the beginning
- Understanding energy modeling
  - What's included and what's not
  - Plug load
  - Schedule assumption
- Prescriptive method is not good

Common Issues

Lack of monitoring systems

- Difficult in monitoring
- Lack of submetering and M&V
- Submetering, if there is, not following modeling categories

Common Issues

Lighting
Plug loads
Space heating
Space cooling
Heat rejection
Pumps & auxiliary
Fan energy
Exterior lighting
Domestic hot water

Example

	Building Performance kbtu/sf/yr	Lighting	Plug loads	Space heating	Space cooling	Heat rejection	Pumps & aux	Fan Energy	Exterior lighting	Domestic HW	Energy Cost ($)
Average CBECS 2003	120	709	1,001	1,907	399	0	50	152	23	116	$81,775
ASHRAE 90.1 BASE BUILDING	98.9	586	827	1,576	330	0	41	126	19	96	$68,146
DESIGN BEFORE SOLAR	86.4	288	677	1,022	860	11	95	86	19	88	$53,466
DESIGN W SOLAR THERMAL	55.5	288	677	296	509	11	95	86	19	0	$41,016
DESIGN WITH SOLAR THERMAL & PV	30.7	0	677	95	307	0	0	0	0	0	$18,534
	30.7	288	677	296	508	11	95	86	19	0	
	30.7	0	677	74	127	0	95	86	19	0	

Common Issues

Lack of involvement

- Many building owners not having energy modeling files and LEED documents
- Lack of connection between facility planners, finance office and facility managers
- Designers disconnected after occupancy

What Owners Should Know

Design Process

RFP for Designers

- LEED project experience requirement is not enough.
- Specify energy and water goals.
- Require modeling and verification experience or capability and include in the service.
- Require LCCA experience and include in the service.

What Owners Should Know

Design Process

Team

- Can your project use Integrated Project Delivery method instead of design-bid-build?
- Assign owner's PM and **FM** from the beginning.
- Involve end-users.
- Combine CxA + LEED consultant as owner's rep.

What Owners Should Know

Design Process

Contracts and Submissions

- Design decision making must be backed up by LCCA.
- Clearly define deliverables
  - Energy modeling
  - LCCA
  - LEED scorecard and checklist
- Post Occupancy Involvement

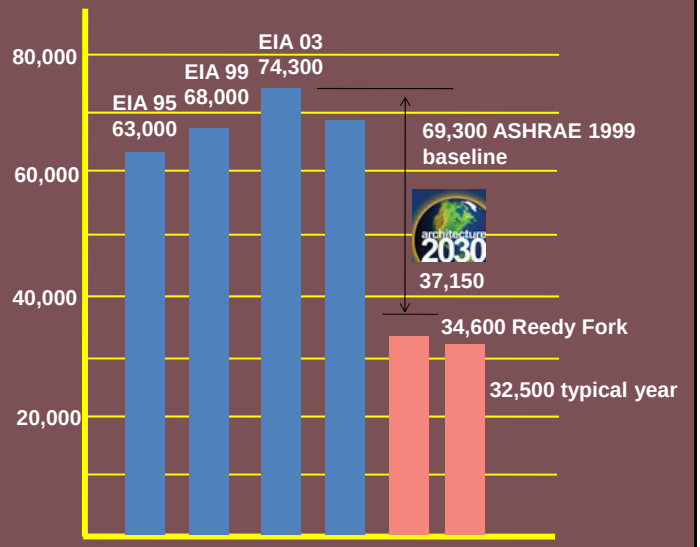
What Owners Should Know

Design Process

Coordinations and Owner's Inputs

- FM's inputs throughout
- O&M cost and accessibility consideration
- Be familiar with energy and water projections
- Question designers how systems and products are selected

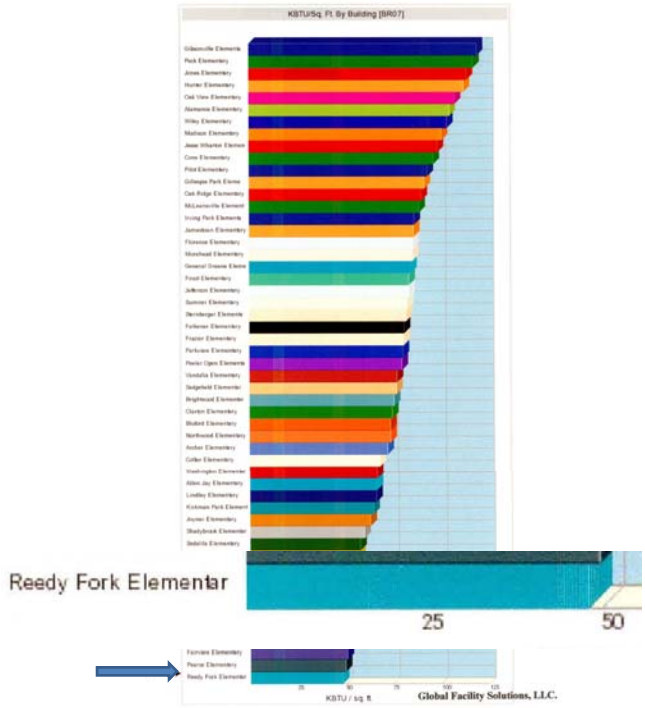
Reedy Fork Elementary Energy Performance



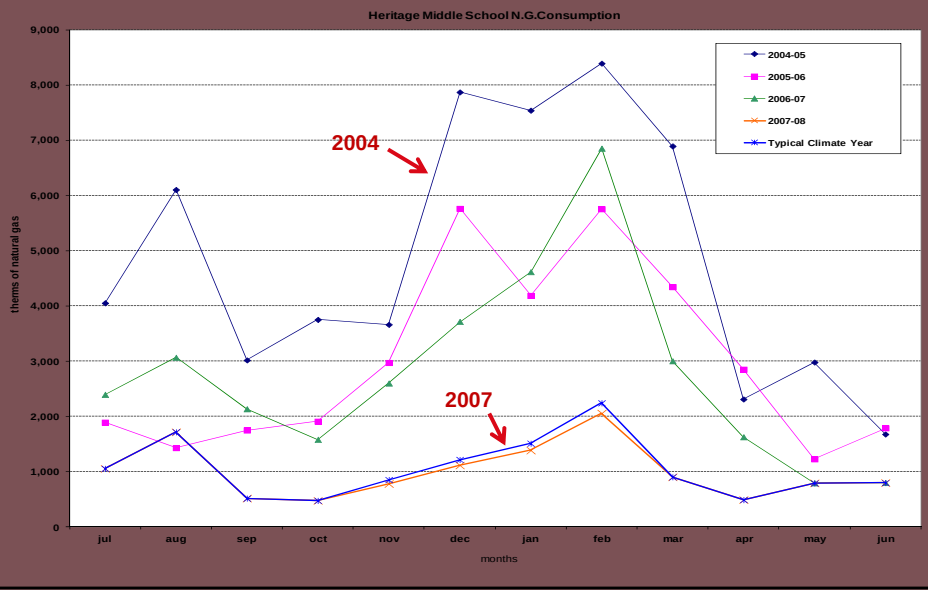
Btus/square foot/year (projection based upon first half year of data)

EXAMPLE

Reedy Fork ES
Greensboro, NC



Heritage Middle School



Thank You!

Contact

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