Cost and Benefits of Commissioning LEED-NC Buildings

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Consultant under contract to the Governor’s Energy Office
Background

- 2006 research project funded by GEO
- Encompassed 11 LEED-NC certified projects
- Published white-paper and summary report
- Included expanded Cx discussion for NCBC
Background

- **State Executive Orders and Legislation**
  - **Energy Performance Contracting to Improve State Facilities**
    - Executive Order D-014-03 (July 16, 2003)
  - **Greening of State Government**
    - Executive Order D-005-05 (July 15, 2005)
    - Goals and Implementation, EO D0011 07
    - Detailed Implementation, EO D0012 07
  - **Greening of State Government Buildings**
    - Senate Joint Resolution 06-032 (May 8, 2006)
    - High Performance Buildings Bill, SB51 (April 26, 2007)

- **City and County Resolutions**
Background

**Governor’s Energy Office:**

- Supports HPD(LEED)/ESPC/Energy Mgmt (Cx)
  - No-Cost Technical Assistance and Education (State, Higher Ed, K-12)
- $500k in high performance design grants
- Facilitated $130M in ESPC to-date
- LEED reports and HPD/ESPC/Cx resources at [www.colorado.gov/rebuildco](http://www.colorado.gov/rebuildco)
Objectives

Report Helps Answer:

- Is LEED-NC cost effective?
- What does it cost to build a high-performance green building?
- What is the cost-premium for a LEED-NC certified building?
- How much should I budget for a LEED-NC building and commissioning of a LEED-NC building?
- Of the four LEED-NC certification levels available, do certain levels cost more than others to obtain?
- What are the factors that make some LEED-NC projects cost less than others?
- Why do some projects cost so much more, and how could costs be better managed in the future?
Cost Basis

- As if building was not constructed to LEED-NC criteria
- Some teams consider Cx, modeling, and other LEED items as business as usual
- “LEED costs too much!” - Depends on the frame of reference
Projects At-A-Glance

2003
- CH2M HILL North Building
- City of Boulder, North Boulder Recreation Center

2004
- CH2M HILL South Building
- CH2M HILL West Building

2005
- Aspen Skiing Company, Snowmass Golf Clubhouse
- Colorado College Tutt Science Center
- University of Denver Ricketson Law Building
- Poudre School District, Fossil Ridge High School
- Colorado Department of Labor & Employment Addition
- Pikes Peak Regional Development Center
- City of Fort Collins, Utilities Vehicle Storage

5 CERTIFIED
5 SILVER
1 GOLD
Summary of Findings

• Cost premium of 1% to 6%
• Soft costs averaged $1 per square foot (0.8% of construction costs)
• NPV of energy savings offset LEED costs in 7 of 9 projects reporting energy data.
• Two projects complete within schedule and budget.
### Summary of Findings

- **NPV assumes 6% discount rate over 20 years.**

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Summary of Findings - Cx

• 10 projects reporting data, counting one CH2M Hill building
• All but one project incorporated enhanced Cx
• Cx averaged $0.55 per square foot
• Cx ranged from $0.19 to $1.50 per square foot
• Cx represents ~60% of LEED-NC soft costs
Summary of Findings – Cx Cost
Summary of Findings - Cx

• All but two projects were strong advocates of Cx, however all projects are going to commission again.

• Three projects pursue Cx as business as usual due to the perceived return on investment.

• Two projects saw Cx costs recovered almost immediately in the design phase through identification of cost savings opportunities.
CH2M HILL
North, West, South Buildings
Englewood, Colorado

LEED-NC CERTIFIED
v2.1 May 2003
v2.1 January 2004
v2.1 Jun 2004

- Lowest cost per square foot
- Cx provided by owner
- Repeatative project type
- Predicted energy savings being achieved
- No unforeseen maintenance issues
- Cx resulted in more organized documentation and baseline data for ongoing O&M
- Enhanced Cx to be part of all future projects
- 2% added to budget to cover added cost of LEED
Aspen Skiing Company
Snowmass Golf Clubhouse
Snowmass, Colorado

LEED-NC SILVER
v2.1 2005
LEED critical because of 3rd party stamp of approval, not because drives green design

Cx is one of the most important requirements of LEED

Commissioning saved 2/3 of their fee during the design stage

Commission all projects

No impact on project timeline due to LEED

Owner feels Cx provided less than 10-year payback
Colorado College
Tutt Science Center
Colorado Springs, Colorado

LEED-NC CERTIFIED
v2.1 Mar 2005
- Life cycle conscious and previously performed in-house testing and balancing
- Expectations regarding Cx were not met, many controls problems remained
- Pursuing LEED on their next project and occupant satisfaction is high
• First LEED-NC law school
• DU has commitment to Cx for all buildings
Poudre School District
Fossil Ridge High School
Fort Collins, Colorado
Cx standard practice
- Frees up maintenance personnel, provides better documentation, accountability, and representation
- Built within typical construction costs for area schools
- Delivers $100,000 energy savings per year
- First state-owned LEED certified building
- Cx gave owner stronger voice
- Cx now standard on all projects
- Built within original program, budget & timeline
- Set goal of LEED during A/E short-list process
Established goal of LEED and Cx at start of design
Building came in under budget
Complex mechanical systems ran more efficiently due to Cx
Pikes Peak Regional Development Center
Colorado Springs, Colorado
• Cx too documentation and time intensive
• LEED Cx documentation was streamlined
• City Council Resolution requires attempting LEED
Summary of Conclusions

- LEED-NC is cost effective
- The cost-premium for a LEED-NC certified building is 1% to 6%, but the added cost depends on your frame of reference
- Budget $.60-$ .80 per square foot for commissioning of a LEED-NC building, more for more complex systems
- Not enough data was available to determine if certain certification levels cost more than others to obtain
- Commissioning contributed to the success of all LEED-NC projects
Areas for Future Research

- Confirming predicted energy savings – measure effectiveness of Cx
- Examine benefits beyond energy – Cx O&M, water, productivity
- Quantify effect of LEED-NC v2.2 regarding changes to Cx EA p1
Thank you!

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