

Ecobuild America and AEC-ST
Washington DC

COMMISSIONING
*Existing HVAC Systems for
LEED and Energy Savings*

Workshop W202
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What is Commissioning?

The Commissioning Process
is
Quality Assurance
in
Building Construction

Will Occupants Commission Your Building?



- Low Productivity
- Poor Morale
- Absenteeism
- Sick Leave
- Medical Claims
- Litigation

University of San Diego Study

- Study on the Increased Value, Economy of Operation and Tenancy of Green Buildings
- Burnham-Moores Center for Real Estate at the University of San Diego. *The Economics of Green*, Dr. Norm Miller, Jay Spivey (Sr. Director Of Product Mngmt, CoStar Group, Real Estate Information) and Andy Florance (CEO, CoStar)

USD CoStar Study Buildings

CoStar's Green Database

- Energy Star---1,198 Buildings, 321,905,688 SF
- LEED---580 Buildings, 99,450,834 SF
- Totals---1,778 Buildings, 421,356,522 SF
- 70% Office, 20% Retail, 10% hospitality, Industrial, Other

USD CoStar Study Buildings

CoStar's Green Database

- Class A
- 350,000 SF, 5 stories average
- 20 years old average
- Multi-Tenant, Leased
- \$30/SF/Yr Rental Rate

USD CoStar Study Buildings

Occupancy Rates

- 2005 2% Higher Occupancy Rates for Energy Star Buildings
- 2007 3% Higher Occupancy Rates

USD CoStar Study Buildings

Direct Rental Rates

- 2005 About \$1.00/SF Higher for ES—4%
- 2007 About \$2.50 Higher for ES---8.5%

USD CoStar Study Buildings

Sales Price per SF

- 2005--30% Higher for Energy Star Buildings (\$300/SF for ES)
- 2007--15% Higher for ES Buildings (\$340/SF for ES)

USD CoStar Study Buildings

Operating Costs

- 10% to 20% Lower Operating Costs

Commissioning Existing Building Systems

The Model EBCx Process



Phases of EBCx

- RFP and Contract
- Pre-Investigation / Planning
- Investigation
- Implementation
- Occupancy

Owner Staff Involvement Imperative



RFP and Contract

- RFP Walkthrough—Key Decision Makers
- Data to be Gathered
- Training and O&M Manual services
- Contract Provisions
- Schedule / Working Hours
- Program Rebates



Equipment and Tasks = scope

- HVAC
- Lighting
- Envelope
- Back-up Power
- Renewable Resources
- Envelope
- Security
- Voice-Data
- Irrigation
- Off-Site Monitoring



Pre Investigation High Level Strategic Plan

- Orientation Walkthrough
- Performance Criteria
- Team---Use of O&M Staff
- Automatic Repair of PAWLS
(Programming, Actuators, Wires, Leaks,
Sensors) as required to test systems
- Findings Report Frequency/Format
- EBCx Plan---General



Pre Investigation O&M Level

- Orientation—Bldg Manager/Super, O&M Staff
- EBCx Plan—Specific



Pre Investigation Information Gathering

- Existing Documents
- Baseline Energy and Operations Data
- Budget for O&M Repairs
- Budget for Capital Repairs
- Operational Problems
- Safety
- Security



Pre Investigation Current Facilities Requirements (CFR)

- Same as OPR in New Cx
- Starts with the Owner's Strategic Plan
- Results of Information Gathering



Investigation Phase

- Inspection
- Functional Testing
- Preferred PAWLS (Programming, Actuators, Wires, Leaks, Sensors) contractors identified
- Trend Logs
- On-Line Issues Log



Investigation — O&M Docs Preliminary Upgrades

- Add New BAS Programming, Delete Old
- Add New PAWLS documents, if required
- Document O&M Deficiencies



Investigation — Submit Report

- Low Cost, No Cost Items
- Capital Projects
- Paybacks
- Confirmation of Success Parameters



Implement Repair

- Use Facility O&M Staff or Contractors
- Low Cost No Cost—Small Works Contractors
- Capital Projects—Design, Tender, Build, New Building Cx



Implement M&V

- Revise Preventive and Predictive Maintenance Schedules
- Program Initial Trend Logs
- Establish Success Parameter Monitoring



Implement Documentation

- Re-draft As-Built One-Line Drawings
- Plastic Laminate Docs and Signs and Post



Implement Training

- Training Staff and Occupants
- Use O&Ms and One-Lines as Syllabus
- Digitally Record—Produce DVDs



Occupancy and Operations Phase Hand-off to O&M Staff

- Hand-off Implementation Phase to O&M Staff
- Convene EBCx Lessons Learned Workshop
- Verify New Maintenance Schedules
- Verify New Signage
- Begin Transition to Continuous EBCx



Occupancy and Operations Phase

- Complete Seasonal Testing as Required
- Perform the Occupant Survey
- Optimize Systems
- Verify Correct BAS Programming
- Conduct Spot Tests of BAS and TAB
- Conduct Spot Tests for VOCs and Micro-Organisms
- Confirm Transition to Continuous EBCx



LEED for Existing Buildings Operations and Maintenance

- Passed by vote of members, January, 2008
- EA Credit 2.1—Investigation and Analysis
- EA Credit 2.2—Implementation
- EA Credit 2.3—Ongoing Commissioning
- Pre-1, Pre-2, credits 1, 3.1, 3.2, 3.3 (M&V), 4.1-4.4 (Renewable) & IEQ Credits also require Cx



LEED for Existing Buildings Operations and Maintenance

Prerequisite 1

- Building Operating Plan
- Systems Narrative
- Sequence of Operations
- PM Narrative / Document

All Existing Building Commissioning!

LEED for Existing Buildings Operations and Maintenance

Prerequisite 2

- Energy Star Score of 69 or higher

Existing Building Commissioning Does It

LEED EB: O&M

EA Credit 2.1— Investigation and Analysis

Intent—Develop an understanding of the building's systems

Option A:

- EB Cx plan and conduct investigation and analysis
- Breakdown energy use from Pre-Req 1, ASHRAE Level I Energy Audit
- List occupant problems and capital improvements

Option B:

- Conduct an ASHRAE Level II Energy Audit
- Savings and cost analysis of all practical measures—fit owner's programs
- List capital improvements that provide cost-effective savings

LEED EB: O&M

EA Credit 2.2— Implementation

- Implement low-cost/no-cost projects from Credit 2.1
- Provide staff training
- Demonstrate savings from measures
- Update the building operating plan

LEED EB: O&M

EA Credit 2.3— Ongoing Commissioning

- Implement a continuous commissioning program
- Cycle less than 24 months
- Complete at least half of work before applying for LEED-EB
- Update the building operating plan

LEED EB: O&M

Plus Other Credits Requiring Cx

- Pre-1, Pre-2
- Credit 1 (energy)
- Credits 3.1, 3.2, 3.3 (M&V)
- Credits 4.1-4.4 (Renewable)
- IEQ Credits

Thank You For Coming!

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