**COMMISSIONING**

*Existing HVAC Systems for LEED and Energy Savings*

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**What is Commissioning?**

The Commissioning Process is Quality Assurance in Building Construction

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**Will Occupants Commission Your Building?**

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

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**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)

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

**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 — fits 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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December 9, 2008

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