

British Columbia Chapter ASHRAE

Existing Building Commissioning

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WCxM
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COURSE TITLE

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Course ID: 0090010881

Approved for:

1 General CE hours

1 LEED-specific hours

LEED GREEN ASSOCIATE

LEED AP BD+C


LEED AP HOMES

LEED AP ID+C

LEED AP ND

LEED AP O+M

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Learning Objectives

1. Use the basic differences between new building and existing building commissioning to expedite the existing building Cx process.
2. Apply commissioning documents to satisfy LEED requirements while at the same time using them to promote team communication and understanding.
3. Ensure the best possible Operations and Maintenance for the life of the building by preparing the O&M staff to succeed.
4. Recognize the improvements of LEED V4 commissioning that ensure quality and provide perseverance so that efficiency continues for the life of the building.

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Course Description

Although new building commissioning is widespread; it is not as widely known that the process has tremendous utility for existing buildings. Learn how to incorporate commissioning for your project initiated under the LEED 2009 for Existing Buildings Operations and Maintenance program. Your instructor authored the original LEED commissioning training program and founded the AIA Committee on the Environment (COTE) Commissioning Advisory Sub-committee, as well as serving as the founding secretary of ASHRAE GDL 0.2 Existing Building Commissioning.

This program begins with an overview of the ASHRAE commissioning quality assurance process, the USGBC LEED program and others. It focuses on the process for existing buildings and the specific tasks that have been chosen for the LEED v3 and v4 Building Operations and Maintenance programs. The roles of various parties to the commissioning process will be explained as well as the timing and approximate costs of existing building commissioning projects.

Commissioning Existing Buildings---How and Why

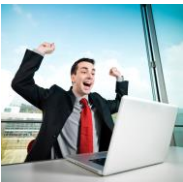
Same as New Building Cx Except

- No Design to Check
- OPR Becomes CFR
- No Contractor on Site
- O&M Staff Involvement
- Energy Audit Included




Financial Benefits of Commissioning Existing Buildings

- Energy Savings
- Cash Incentives
- Equipment Life
- Productivity



NEEA Study of Commissioning Existing Public Buildings


- 8 Northwest buildings
- 3.2 year payback on EBCx
- Also improved IAQ and increased O&M staff knowledge



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2009 Harvard EBCx Study


- \$24,710 cost of study and fixes after rebates
- \$11,885 annual savings
- 2.08 year simple payback
- Fastest savings: AHU off when unoccupied
- With zero rebates still has 3.5 year payback



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LBL Evan Mills Existing Building Cx Study 2009

- Updated from 2004 study
- 643 buildings in 26 states
- 100 million SF
- Median Cost \$3.00 / SM for EBCx
- Median Payback 1.1 years
- \$11.60 / SM for New Cx
- Median Payback 4.2 years



2009 PECl—LBL Study on Energy Savings and Measure Cost Effectiveness of EBCx


- 11 utilities
- 122 projects
- Under 2 year payback on EBCx
- <http://resources.cacx.org/library/holdings/Annex%20Report%20Final.pdf>



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The ASHRAE Model EBCx Process: Five Stages

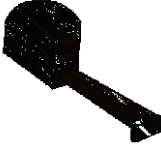
- Strategic---Which Facilities
- Assessment---How Are They to be Done
- Investigation---Functional Test
- Implementation---Real Time Repair
- Occupancy---Training and Trending



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Strategic---Which Facilities and Scope


- > Internal RFP Meetings
- > Buildings + Systems + Tasks = Scope
- > Owner Staff Involvement
- > Incentive Programs
- > Evaluate, Negotiate and Award



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Assessment


- CxA Kick-off
- Define the Team
- Access, Safety and Security
- Schedule
- Current Facilities Requirements
- All Aspects of the Building



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Investigation


- Energy and O&M Records
- Envelop Inspection and Functional Testing
- Major Equipment—Chillers/AHUs/VFDs
- Room-by-Room Temperatures, Addressing
- Small Deficiencies Corrected Immediately



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Implementation


- Re-Test---Functional, Blower Door, Infra-red
- Re-draft As-Built One-line Drawings
- Train Staff and Occupants---DVDs
- Revise PM Schedules
- Set Up Trend Logs



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Occupancy

- Convene EBCx Lessons Learned Workshop
- Verify Upkeep of Documentation and Signage—replace as required
- Complete Seasonal Testing as Required
- Check Trend Logs
- Conduct Spot Tests



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Existing Building
Commissioning,
Audits and Tune-Ups

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Existing Building Commissioning
is Not an
Energy Audit!

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EBCx Compared to Audit

- EBCx, Energy Audits and Building Tune-Ups are Different
- Develop an EBCx Strategy Consistent With Owner's Capital Plan
- Provide the Short Term Savings of the Tune-up combined with
- Long Term Savings of M&V



Audits, Tune-Ups and EBCx

- Audits Came 1st---1970's
 - Finds ways to save energy given current conditions. No persistence, no QC.
- Tune-Ups Came 2nd—1980's
 - Fixes low cost / no cost malfunctions. No persistence, no QC
- EBCx came 3rd---1990's
 - Combines strategy, real time fixes, new ECMs and long term M&V



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Audits


- Collect and Analyze Energy Records
- Study Building Space Use
- List Low Cost / No Cost
- List ECMs and Paybacks
- Optional—Design, Rebates and Construction Admin



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Tune-Ups


- Study Building Operation
- Fix Low Cost / No Cost Breakdowns
- Implement Improved Maintenance
- Train O&M Staff



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EBCx


- Create Current Facility Requirements
- Study Strategic Capital Plan, O&M Procedures
- Energy, Space Use, ECMs and Paybacks
- Fix Low Cost / No Cost Breakdowns
- Training, O&M Documents
- Trend Logging / Ongoing Cx



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EBCx Has Legs

- Audits and Tune Ups Pick the Low Hanging Fruit
- EBCx Integrates Long Term Strategy with Persistence
- Reviews O&M and Re-trains
- Implements Web-Enabled O&M, Logging/AFD



Streamlines O&M


- One-Line Power Diagrams
- One-Line Air/Water Side HVAC Diagrams
- Ceiling Tile Markings
- As-built Control Sequences
- As-built BMS Architecture



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EBCx Provides Best Information

- Starts With O&M Staff Interviews / LL
- Fixes LC/NC Items to Allow Real Data Measurement
- Real-Time Fixes Reveal More Issues
- Immediate Savings and Comfort




Conclusion

- If the Client Says EBCx, Confirm Scope
- If LEED EBOM is the Goal, EBCx is the Solution
- Educate the Client--Go For EBCx
- Value Added for the Consultant and the Client
- Add Persistence and Face-Time

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Commissioning Examples for Existing Health Care Projects


- American Healthcare Facility Rules are Set by The Joint Commission (TJC)
- The Following Slides Show Some Typical Examples of Commissioning Applied to Healthcare Projects



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Periodic Recommissioning and TJC Requirements


- Not Preventive Maintenance
- Identify Items That “Fall Through the Cracks”
- Documentation Tune-Up



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TJC Environment of Care Examples

- 7.10---Managing utility risks
- 7.30---Maintaining, testing, and inspecting (ITM) utility systems
- 7.40---ITM emergency power systems
- 7.50---ITM medical gas & vacuum systems



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Managing Utility Risks
TJC 7.10

- Periodic Review of Emergency Procedures
- Mapping and Labeling of Utility Systems
- Minimize Waterborn Pathogens
 - Aerosolizing Water Systems and Cooling Tower Water Treatment
- Minimize Airborn Pathogens
 - Room Pressurization Checks
 - Filter Pressure Drop Gauges---Marked?

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Utility Systems
TJC 7.30

- Confirming Complete and Effective Safety Testing
 - Power Outlets
 - Polarity and Grounding
 - 25% per Year
- Maintaining PM Documentation
 - Life Support, Infection Control, Non-LS
 - Review Completeness of Lists

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Emergency Power Systems
TJC 7.40


- Emergency Generators are Run
- Backup Batteries are Tested
- Periodic RCx is Used to Identify Misadjusted Battery Powered Lights



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Medical Gas & Vacuum Systems
TJC 7.50

- RCx Confirms Pipe, Rack and Container Labels are in Place
 - Automatic pressure switches
 - Shutoff valves
 - Outlets



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Resources for Further Learning

- California Commissioning Collaborative. CA Commissioning Guide for Existing Buildings and the CA Commissioning Guide for New Buildings. Both 2006. <http://www.documents.dgs.ca.gov/green/commissioningguideexisting.pdf> and <http://www.documents.dgs.ca.gov/green/commissioningguidenew.pdf>
- "The HVAC Commissioning Process", ASHRAE Guideline 0-2005 (supersedes Guideline 1-1996) and/or 1.1-2007 and 1.3-2011. Order at 800-527-4723, or on the Internet at http://www.techstreet.com/ashrae?ashrae_auth_token. The link is for the publications page. search for "commissioning" = 300+ documents.
- The Portland Energy Conservation web-site contains an extensive collection of commissioning information. <http://www.peci.org/resources/searchable-library> In list on the left, go to "Commissioning Plans & Guide"

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Resources for Further Learning

- Building Commissioning Association <http://www.bcx.org/knowledge-center/bca-public-library/> Free Best Practices documents + External Links +more
- The US General Services Administration (GSA) <http://www.wbdg.org/ccb/GSAMAN/buildingcommissioningguide.pdf>
- CA Collaborative of High Performance Schools (CHPS) 2006 Best Practices Manual. Very thorough Cx guide for schools <http://www.chps.net/dev/Drupal/node/288> Membership is free for schools and districts.
- CIBSE <http://cibse.org/> Do Topic Search for Commissioning. Set of seven guides. Free download to CIBSE members = \$175.

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Resources for Further Learning

- CA Sustainable Schools Commissioning Web Site
<http://www.sustainableschools.dgs.ca.gov/SustainableSchools/sustainablecommissioning/commissioning.html> Some of the same resources as CACx and some different.
- California Title 24 Commissioning
<http://www.energy.ca.gov/title24/2013standards/index.html> Go to Standards, Compliance Manuals and Forms, 2013 Building Energy Efficiency Standards, Section 120.8.
- Washington State Department of Enterprise Services
<http://www.des.wa.gov/services/facilities/Energy/Commissioning/Pages/default.aspx>
 - Washington, Idaho, Montana
 - Better Bricks, Energy Ideas Clearinghouse, NEEA

Q & A



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Thank You for Attending!

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