

Class 15: Total Building Commissioning

- 1) There are many versions of what constitutes commissioning, but fundamentally, it's a process to make sure the systems and assemblies (e.g. heating [active/passive/conventional/renewable], cooling, electrical, lighting) in a building are:
 - a) Planned
 - b) Designed
 - c) Installed
 - d) Operational
 - e) Maintainable
 - f) TO MEET THE OWNER'S PROGRAM AND DESIGN TEAM DESIGN CRITERIA.

- 2) Therefore, it doesn't begin at the END of the construction but at the BEGINNING.
 - a) Serves as the historical record of the owner's expectations for the project performance throughout the project delivery process
 - b) It serves as a record of Why, How, and What was decided by the owner and delivery team throughout the project.
 - c) Documents the performance standards that were agreed upon – this occurs throughout project development and includes final acceptance
 - d) Verifies that the building designed and as constructed meets the stated standards. – this occurs through inspections, tests, and training
 - e) Leaves owner with a complete set of documents about the building operation

- 3) Variations
 - a) Depth and Breadth. Not all systems may be commissioned to the same depth (level of detail), and not all systems need the same elaborate structure of planning the commissioning (breadth). Depends on the project size, mission.
 - b) Cost. TBC adds approximately 1.0 – 2.5% to total project cost, depending upon the TBC choices in (a). Historical records indicate the savings gained by corrections made due to the commissioning reduce the project cost growth by two to three times the cost of the TBC activities.
 - c) TBC management can be done a variety of ways – in-house, outside expert consultant, a Commissioning Agent for different phases of the project. For LEED certification, commissioning MUST be done a certain way.

- 4) Typical sequence of events when TBC occurs:
 - a) Establish Goals for Quality, Efficiency, and Functionality
 - b) Establish a Commissioning Approach and Scope
 - c) Establish Commissioning Budgets
 - d) Establish Commissioning Plans
 - e) Establish Commissioning Schedules
 - f) Establish Testing and Inspection Plans

- g) Develop Commissioning Specifications
 - h) Determine Special Testing Needs
 - i) Establish Re-Commissioning Plans
- 5) Codes, standards guidelines for Commissioning
- a) ASHRAE
 - b) NIBS – National Institute of Building Sciences
 - c) USGBC (LEED)
 - d) Building Commissioning Association
 - e) Various states have their own guidelines
- 6) LEED example and acronyms:
- a) Cx
 - b) E&A
 - c) CxA
 - d) OPR
 - e) BOD
 - f) PFT
 - g) DDC system
 - h) FTPs

Publications

- [*Building Commissioning: The Key to Quality Assurance*](#) (PDF 1 MB) U.S. Department of Energy Rebuild America Guide Series, 1998. Commissioning retrofits and existing buildings: overview, process, and case studies. 77 pp, PECl.
- [*The Building Commissioning Handbook 2nd Edition*](#), by John A. Heinz, PE and Richard B. Casault, PE. Alexandria, VA: APPA: The Association of Higher Education Facilities Officers, Phone: (703) 684-1446, ISBN: 1-890956-28-7.
- *Commissioning Guidelines, Instructions for Architects and Engineers* by State of Washington, Dept. of General Administration, Division of Engineering & Architectural Services, 1995. Phone: (360) 902-7272.
- [*The Cost-Effectiveness of Commercial-Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the United States*](#) by Evan Mills, Norman Bourassa and Mary Ann Piette of Lawrence Berkeley National Laboratory, Hannah Friedman and Tudi Haasl of Portland Energy Conservation Inc., Tehesia Powell and David Claridge of Energy Systems Laboratory, Texas A&M University. December 2004.
- [*Guidelines for Incorporating Commissioning into Energy Savings Performance Contracts*](#) PECl, October 2000.
- [*A Practical Guide for Commissioning Existing Buildings*](#) by Tudi Haasl of Portland Energy Conservation Inc. and Terry Sharp of Oak Ridge National Laboratory. April 1999.
- [*What Commissioning Can Do For Your Building?*](#) PECl, 1997. Derived from a database of 175 case studies of commissioning of new construction, equipment replacements, and upgrades in existing facilities. 12 pp. Phone: (503) 248-4636.