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COMMISSIONING THE BUILDING ENERGY MODEL

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ONLINE TRAINING BY KRISHNAJI PAWAR

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

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MODULE
02

Commissioning the Building Energy Model

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Commissioning the Building Energy Model

The energy model and its assumptions can affect the building's energy consumption.

Understand the baseline model and code it evaluates against.

Explain the Commissioning process and goals.

Include process failures and energy use.



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LEARNING OBJECTIVES

- Energy Field Observations
- Why do we do an Energy Model?
- Energy Modeler’s Dilemma
- What Effects Energy Consumption?
- Energy Model Output Shortcomings





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Have you been called back to a project site for complaints about energy usage being too high? (Not measurement and Verification related)

Observations Concerning the Energy Field

- Compared to what was anticipated, monthly energy costs are significantly higher.
- There has been an increase in the commissioning authority's requests for clarification a request was made to the Commissioning Agent to verify both the BOD and the OPR, both of which have energy requirements.
- The Difference Between Regulated and Unregulated Loads





Observations Concerning the Energy Field

Building commissioning ensures that systems are installed and working properly. On-site commissioning is common. Building owners can maximize energy savings and performance by combining these two processes. This lecture discusses how energy models improve building commissioning, with examples.



- BEM is physics-based software simulation of building energy use. A BEM program takes as input a description of a building including geometry, construction materials, and lighting, HVAC, refrigeration, water heating, and renewable generation system configurations, component efficiencies, and control strategies.
- Energy modeling and building commissioning work together to improve building performance and save energy. Energy modeling is a computer simulation of a building's energy performance that predicts energy consumption based on design choices. Remote energy modeling.

Why do we do an Energy Model?

- Energy models help building commissioning identify energy savings opportunities.
- Commissioning agents can use energy models to verify building system performance and energy savings.
- An energy model may estimate a 20% energy savings from a new lighting system.
- Energy modeling and building commissioning work together to improve building performance and save energy.

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Why do we do an Energy Model?

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- Building owners can maximize energy savings and building performance by using energy models to identify energy savings opportunities, validate building system performance, and evaluate building performance after commissioning.
- Energy models help building commissioning optimize HVAC systems, install energy-efficient lighting, and evaluate solar panel performance.
- Building commissioning and energy modeling should be part of any construction or renovation project.

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Energy Modeler’s Dilemma

- Greenwashing and the pursuit of points

- It's all about the money, money, money!

  Financial Benefits for Utilities
- Marketing Benefits and entitlements
- Grants, etc.
- There is no motivation to be "real"
- An increase in the cost of consulting





Energy Modeler’s Dilemma +

- Measuring avoided energy use (against a "what could have been" energy baseline).
- Implementing proper adjustments for factors such as weather, production volume, level of occupancy, etc. within and beyond control.
- Accounting for interactive effects (for instance, when implementation of an ECM will have an influence on the energy consumption of other equipment).
- Remaining consistent with existing standards, other projects, and time.
- Ensuring a proper trade-off between rigor (accuracy and confidence) and effort.
- Balancing the interests of all involved parties
- Aligning with local market specificities







What Effects Energy Consumption?

- Schedules
- Efficiency of Weather-Related Equipment
- envelope; occupancies; heating, ventilation, and air conditioning (HVAC) systems; lighting; process loads; receptacle loads;
- Utilization of water resources

Are these the only loads that exist in a structure???





Energy Model Output Shortcomings

- Specify the optimal conditions and the assumed amount of energy consumption for the most stringent operational conditions (i.e., the EPA MPG standards).
- The results will only be as good as the effort that was put into them.
- Cannot create a budget based on the usage, and the actual costs are frequently much higher than what was assumed in the energy modeling for the permit or the design.
- Make it a priority to display compliance ratios and margins as a means of motivating the design team as well as the owner.
- Baseline is an industry-wide standard that can be applied in all facets of the construction business.
- Unable to construct budgets for the owner's utility costs
- Does not take into account any changes that may occur after the design or the obtaining of permits!







Construction Commissioning Process

Construction Review Process

- Submittals
- RFIs
- Value

Does the CX authority get all the relevant information to ensure the OPR and BOD is met?

What happens when an Owner accepts changes contrary to the OPR and original design drawings? Code implication? LEED?

What is the CX authority‘s obligation?

- Owner?
- Industry?
- USGBC?

Construction Commissioning Process

defines commissioning as:

‘...the advancement of a fixed building service after all or part of the system has been installed, replaced, or altered. The system is brought from a state of static completion to working order. Testing and adjusting, as necessary, ensure that the whole system uses no more fuel and power than is reasonable in the circumstances without compromising the need to comply with health and safety requirements.

'For each system, commissioning includes the following: setting-to-work; regulation (that is, testing and adjusting repetitively) to achieve the specified performance; calibration, setting up, and testing of the associated automatic control systems; and recording of the system settings and the performance test results that have been accepted as satisfactory.’

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