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APPLICATIONS OF ENERGY MODELS FOR BUILDINGS

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MODULE
L8

Building Energy Modeling Skills and Simulation Adaptation

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APPLICATIONS OF ENERGY MODELS FOR BUILDINGS

Simulation adaptation and customization are crucial skills in building energy modeling, as guided by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). These skills enable practitioners to navigate the complexities of energy simulations across various project phases, building uses, and regulatory frameworks.

Learning Objectives

- Introduction and Course Outline
- Simulation Comparisons
- Modeling Energy Performance
- **BEM Skills and Simulation Adaptation**
- Baseline Building Models
- Communicate Analysis Results
- Collaborate Within Project Teams
- Applications of Energy Models for Building
- Case Study: Application of BEM
- Summary and Resources
- BEMP Practice Test V.5.1



INTRODUCTION

- Essential skills in building energy modeling, guided by ASHRAE.
- Simulations must evolve as a project progresses, from conceptual design to operation.
- At the conceptual phase, simulations are used for feasibility studies, focusing on energy use intensity and heating and cooling loads.
- As the project progresses, simulations should become more detailed, incorporating specific materials, mechanical systems, and occupancy schedules.
- Customizing simulations for changes in building use is crucial for accurately reflecting new operational dynamics.
- Accurate modeling requires distinguishing between regulated and nonregulated energy use.
- Defining model inputs for both baseline and proposed design models involves considering building geometry, envelope characteristics, HVAC systems, internal gains, and renewable energy contributions.

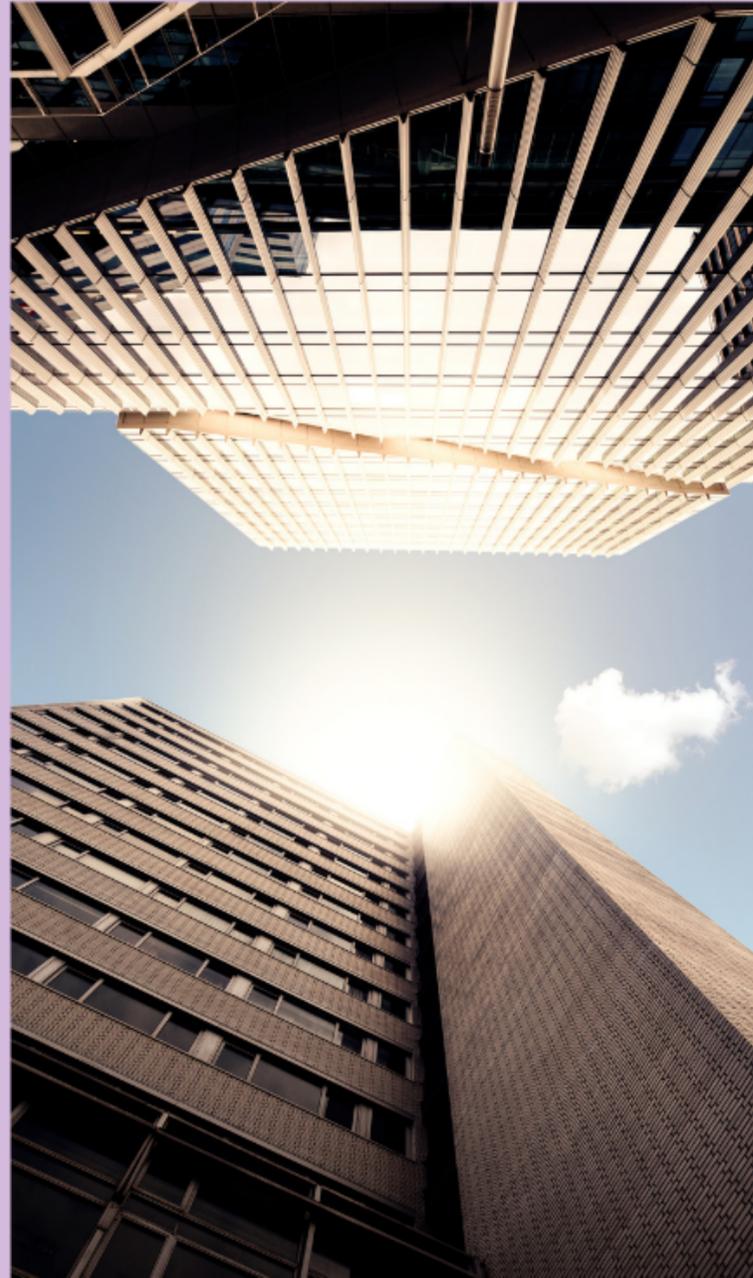
ADAPTING SIMULATIONS TO PROJECT PHASE

- Energy simulations evolve as a project progresses through its phases.
- Simulations should be updated to reflect actual window specifications, shading devices, and anticipated performance of building systems.
- The model should reflect the evolving understanding of the project's requirements and constraints





CUSTOMIZING SIMULATIONS FOR CHANGES IN BUILDING USE



- Buildings often undergo changes in use over their lifespans, necessitating customizations in energy modeling to accurately reflect new operational dynamics.
- The energy model must be customized to accommodate the new occupancy schedules, equipment loads, and operational hours.

DISTINGUISHING BETWEEN REGULATED AND NONREGULATED ENERGY USE

- Regulated energy use refers to the energy consumption governed by codes and standards, such as heating, cooling, ventilation, and lighting.
- Nonregulated energy use encompasses the energy consumption associated with processes and equipment that are not strictly regulated by codes.
- Accurate modeling requires an acknowledgment of both categories to provide a comprehensive view of the building's energy profile.



DEFINING MODEL INPUTS FOR BASELINE AND PROPOSED DESIGN MODELS



- Creating a reliable energy model necessitates a clear definition of inputs for both the baseline and proposed design scenarios.
- The baseline model often reflects a "standard practice" building as defined by ASHRAE standards, representing the minimum requirements of energy codes.
- The proposed design model incorporates specific design decisions that deviate from the baseline, such as enhanced insulation, advanced HVAC technologies, or renewable energy sources like solar panels.

DEFINING MODEL INPUTS FOR BOTH MODELS

- Building geometry: Accurate representation of floor area, orientation, and volume is essential for both models.
- Envelope characteristics: Inputs related to insulation levels, window types, and shading devices must be meticulously defined.
- HVAC Systems: The efficiency and type of heating and cooling systems need to be specified for both models.
- Internal gains: Inputs regarding occupancy, equipment loads, and lighting patterns must be detailed for both scenarios.
- Renewable energy contributions: Any contributions from renewable systems must be included in the proposed model.



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