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ENERGY MODELING SPECIALIST
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BUILDING ENERGY MODELING STEP-BY-STEP PROCEDURES FOR LEED CERTIFICATION

ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS

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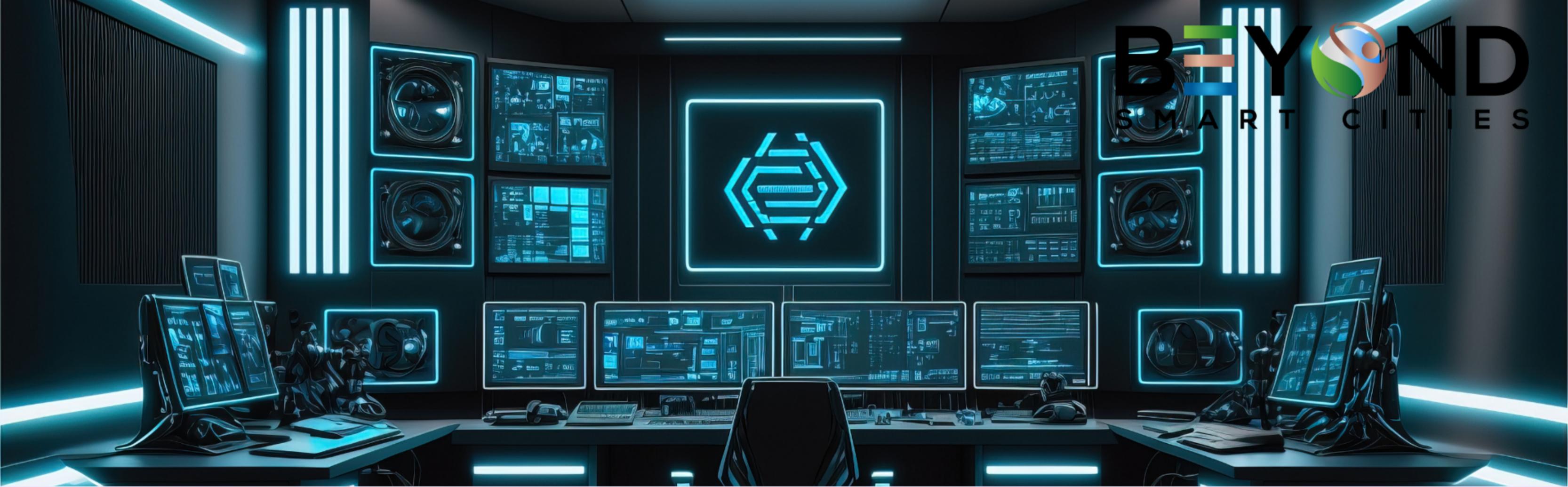
BUILDING ENERGY MODELING : STEP-BY-STEP PROCEDURES FOR LEED CERTIFICATION

BEM simulations are typically conducted using specialized software such as EnergyPlus, eQUEST, OpenStudio, and DesignBuilder. The process involves setting up a BEM simulation by defining the project scope, gathering data, choosing simulation parameters, creating the model, validating the model, and interpreting results.

Learning Objectives

- **Introduction and Course Outline**

- **Building Energy Modeling Checklists**

- **Scaling an imported drawing from AutoCAD**

- **ASHRAE Standards and Guidelines**

- **Zones Input Details in BEM Tools**

- **Setup and Running the Building Energy Modeling Simulation**

- **Review BEM Software Output Reports.**

- **Sample Energy Modeling Report**

- **Summary and Resources**

- **BEMP Practice Test V.4.1**

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INTRODUCTION

- BEM is a crucial practice in sustainable design and energy management.
- It uses computer simulations to predict a building's energy consumption, thermal comfort, and performance.
- Primary purposes include performance prediction, design optimization, compliance verification, and cost analysis.
- BEM simulations are conducted using specialized software like EnergyPlus, eQUEST, OpenStudio, and DesignBuilder.
- The process involves defining the project scope, gathering data, choosing simulation parameters, creating the model, validating the model, and interpreting results.
- The process ensures accuracy and reliability of simulation outcomes through calibration and peer review.
- The results are used for decision-making, identifying energy conservation measures, and reporting findings.

BUILDING ENERGY MODELING (BEM)

- Energy modeling is used to estimate energy consumption for heating, cooling, lighting, and other electrical loads.
- It also aids in design optimization to enhance energy efficiency and occupant comfort.
- It ensures that the proposed building meets local energy codes and standards.
- It also aids in cost analysis, assessing the economic implications of energy-efficient designs over the building's lifecycle.

BUILDING ENERGY MODELING (BEM) SIMULATIONS OVERVIEW

- BEM is a process used to predict energy consumption of buildings and assess energy efficiency design strategies.
- BEM uses computational tools to simulate interactions among a building's physical and operational components and the external environment.

BEM Software Selection

- The choice of software depends on the complexity of the building, availability of data, and user proficiency.
- Commonly used software includes EnergyPlus, eQUEST, and IES VE.

Tools and Software for BEM

- Popular tools for BEM simulations include EnergyPlus, eQUEST, OpenStudio, and DesignBuilder.
- These tools vary in interfaces, capabilities, and complexity, but all serve the same underlying purpose of calculating energy use.

DATA COLLECTION AND INPUT PREPARATION

- A comprehensive dataset is gathered, categorized into building geometry, thermal properties, occupancy patterns, HVAC systems, and weather data.

Model Development

- The next step involves creating a digital representation of the building within the BEM software.
- Key aspects include defining zones, inputting geometry, assigning materials, and defining internal loads.

Running the Simulation

- The simulation process includes pre-simulation checks, simulation execution, and output analysis.
- Validation of simulation results is essential to ensure the reliability of BEM results.

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BEM SIMULATION SETUP AND RUNNING

Step 1: Model Definition Check

- Verify the integrity of the model definition to identify potential errors or warnings.
- Common errors include geometry errors, incorrect thermal zone definitions, and improperly defined HVAC system parameters.
- This stage is likened to proofreading a manuscript before publication.

Step 2: Setting Up the Simulation

- Defining simulation parameters is the next step after validating the model.
- Key parameters include the simulation type, time step, and weather data input.
- Additional configurations are necessary for different types of HVAC systems.

STEP 3: RUNNING THE SIMULATION

- Monitor the simulation process for any immediate feedback from the software.
- Troubleshoot BDL errors by accessing BDL Files, identifying errors, correcting errors, and re-running the simulation.

Step 4 :Troubleshooting BDL Errors

- Access BDL Files: Navigate to Simulation Dropdown Menu, select DOE2 Files, then BDL Files.
- Identify Errors: Search BDL files for specific error messages. These provide insight into incorrect parameters or definitions.

Step 5: Reporting Results

- Document and report findings accurately post-simulation.
- Utilize System and Plant Summaries to report on total energy consumption, peak loads, and operational efficiency.
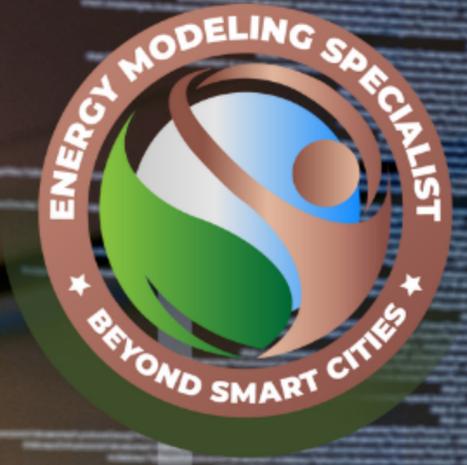
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STEPS IN SETTING UP A BEM SIMULATION

- Define the project scope: Identify specific questions and parameters to answer.
- Gather data: Measure building geometry, material properties, and occupancy patterns.
- Choose simulation parameters: Select climate data and systems and equipment.
- Create the model: Draw the building's footprint, floors, and roof.
- Validate the model: Compare simulation results with historical energy consumption data and engage other professionals to review inputs and assumptions.
- Run the simulation: Initiate the simulation in the software and generate comprehensive reports detailing energy consumption breakdowns, peak loads, and carbon emissions.
- Interpret and utilize results: Identify Energy Conservation Measures (ECMs) and prepare a comprehensive report summarizing findings, methodologies, and recommended actions.

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