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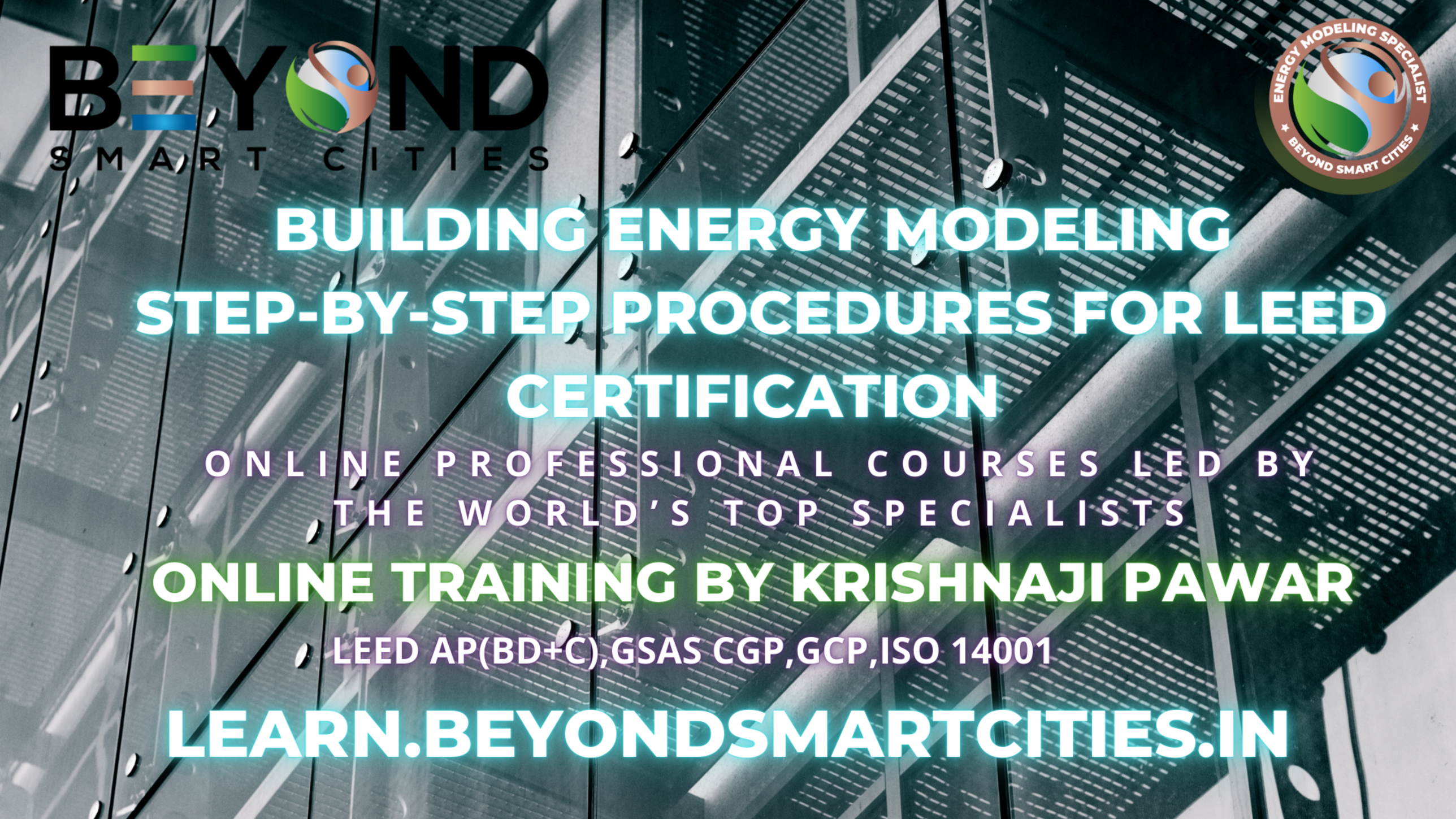
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BUILDING ENERGY MODELING
STEP-BY-STEP PROCEDURES FOR LEED CERTIFICATION
ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS
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MODULE L19

# Zones Input Details in Building Energy Modeling Tools

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

Understanding the input details for zones in BEM tools is fundamental for energy modeling and HVAC system design. The appropriate configuration of these parameters contributes to energy efficiency, occupant comfort, and effective thermal management within buildings.

# 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 tools simulate energy performance of buildings, aiding in energy consumption assessment, design optimization, and environmental impact reduction.
- Zones within a building, such as offices, conference rooms, lobbies, and mechanical rooms, have unique heating, cooling, lighting, and occupancy characteristics.
- Inputs into BEM tools include geometric, thermal, occupancy, and equipment-related details.
- Precision of zone inputs significantly influences energy simulation accuracy.
- Understanding zone interactions is crucial for a holistic understanding of building energy performance.
- Mastering zone inputs can enhance design optimization, enhance performance, and contribute to sustainable architectural practices.

# ZONES IN BEM TOOLS

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- Zones are crucial in simulating thermal behavior of buildings.
- A single HVAC system controls a zone, a space or group of spaces within a building that maintains a uniform temperature.
- Properly defining zones impacts the calculation of heating and cooling loads, airflow dynamics, and energy consumption.

# ZONES IN BEM TOOLS

- Zones are distinct spaces within a building with similar thermal conditions and usage patterns.
- Examples include offices, conference rooms, lobbies, and mechanical rooms.
- Each zone may have different heating, cooling, lighting, and occupancy characteristics affecting its energy consumption.

# INPUTTING ZONE DETAILS IN BEM TOOLS

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- Geometric Details: Includes dimensions (length, width, height) and shape of the zone.
- Thermal Properties: Includes wall, ceiling, and floor construction materials, defining their thermal resistance (R-value).
- Occupancy Details: Involves the number of occupants, their activity schedule, and metabolic rates, dictating the internal heat gains from lighting, equipment, and human presence.
- Equipment Loads: Includes input from lighting fixtures, computers, and other equipment, generating internal heat within the zone

# ZONES IN BEM TOOLS


## Thermostat Type: Reverse Action

- The reverse action thermostat adjusts the HVAC system to maintain a setpoint temperature.
- This type of control is essential in maintaining comfort in spaces with varying thermal loads.

## Throttling Range

- The throttling range, defined as the differential between the activation points for heating and cooling, is a significant parameter in BEM tools.
- For Variable Air Volume (VAV) systems, the throttling range should not be less than 40°F.
- Setting a VAV system to a heating setpoint of 68°F and a cooling setpoint of 78°F enables effective temperature control within a 40°F throttling range.

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# IMPORTANCE OF ACCURATE INPUT

- The precision of zone input details significantly influences the accuracy of energy simulations.
- Errors or oversights in these inputs can lead to misleading results.
- Understanding the interactions between zones is essential for a holistic understanding of building energy performance.

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# SYSTEM INPUT DETAILS AND COMPLIANCE

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## Outflow Ratios

- The outflow ratio determines the performance of HVAC systems within zones.
- VAV systems set the minimum outflow ratio at 0.3, ensuring adequate ventilation and comfort in the zone.
- Package Terminal Air Conditioners (PTAC) and Packaged Single-Zone (PSZ) systems have a minimum outflow ratio of 1.

## Demonstrative Examples

- VAV System in an Office Building: The system maintains a setpoint of 72°F, with a 40°F throttling range.
- PTAC in a Hotel Room: The thermostat is set to 70°F, ensuring a minimum outflow ratio of 1.

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