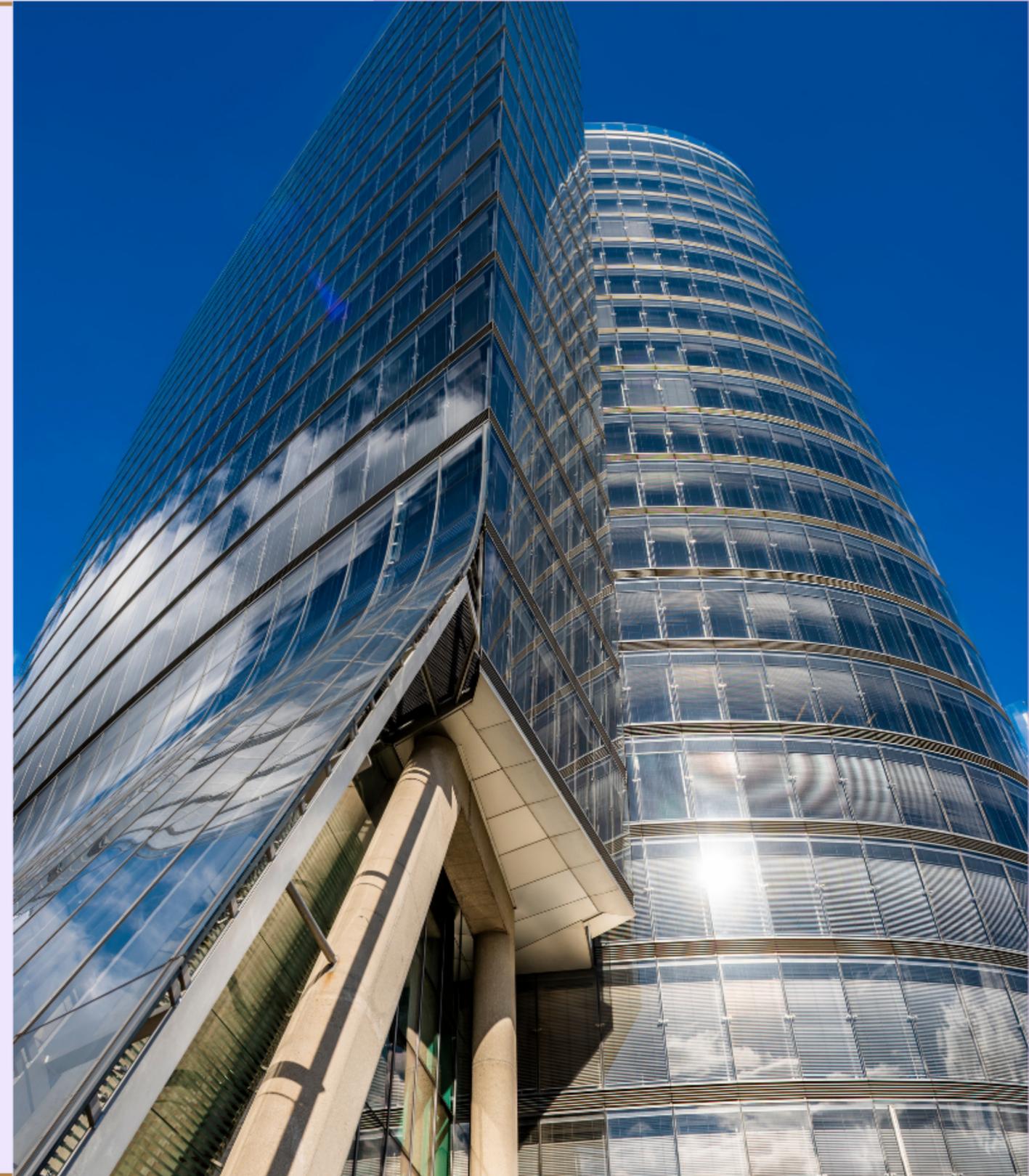# BEYOND
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Façade Section in Building Energy Modeling (BEM) Tools

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

The façade section is a critical component that significantly influences thermal performance, energy consumption, and overall sustainability of a building. The façade acts as a barrier between the interior environment and the external climate, and its design and materials play a vital role in heat transfer processes. The thermal performance of a façade can be characterized by parameters such as U-value, Solar Heat Gain Coefficient (SHGC), and Visible Transmittance (VT).

Learning Objectives

- **Introduction and Course Outline**
- **Building Energy Modeling Checklists**
- **Scaling an imported drawing from AutoCAD**
- **ASHRAE Standards and Guidelines**
- **Façade Section in Building Energy Modeling 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

- Crucial for designing, analyzing, and optimizing building performance for energy efficiency.
- Tools simulate energy consumption through integration of geometry, materials, occupancy, HVAC systems, and climatic conditions.
- The façade section significantly influences thermal performance, energy consumption, and sustainability.
- The façade acts as a barrier between interior and external climate, influencing heat transfer processes.
- BEM tools define façade's geometric configuration, materials, and performance characteristics.
- Simulation settings allow users to set parameters for analysis of façade interaction with building systems and environment.

FAÇADE SECTION IN BEM TOOLS

Definition of Façade

- The façade of a building refers to its external face, including walls, windows, doors, and other architectural elements.
- It acts as a barrier between the interior conditioned spaces and the external environment, influencing energy dynamics through thermal loads, solar gain, and ventilation.

Importance of the Façade in BEM

- The façade significantly affects the thermal behavior of a building.
- The orientation, material, and glazing of a façade influence solar radiation absorption.
- The façade design also impacts natural ventilation

MODELING THE FAÇADE IN BEM TOOLS

- The façade's geometric configuration, materials, and performance characteristics are defined in BEM tools.
- The façade's dimensions, orientation, and surface area must be accurately modeled.
- Each material used in the façade must be defined with its thermal properties.
- The U-value, SHGC, and VT of the façade elements should be inputted into the model.
- Simulation settings allow users to set simulation parameters, including climate data, occupancy schedules, and operational settings.

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THERMAL PERFORMANCE OF THE FAÇADE

- Thermal performance refers to a façade's ability to resist heat transfer, crucial for maintaining comfortable indoor temperatures and minimizing energy consumption.
- Parameters characterized by thermal performance include U-Value, Solar Heat Gain Coefficient (SHGC), and Visible Transmittance (VT).

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VISUAL DOE USES A SYSTEMATIC NAMING CONVENTION FOR FAÇADES: ORIENTATION-FLOOR LEVEL-ROOM NAME.

Wall Types and Glazing Assignments

- Each façade is characterized by its wall type and the glazing properties assigned to it.
- Common wall types include Solid Wall, Insulated Wall, and Curtain Wall.
- The window-to-wall ratio (WWR) is a key metric in this context.
- Adherence to the specified WWR is essential when assigning glazing and windows to a façade.

Considerations for Façade Limitations

- It is crucial to adhere to the 100 façades per block limit in BEM tools like Visual DOE.
- Exceeding this limit can result in a "subscript error," requiring careful planning and organization of the façade designs.

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