

Building Performance Analysis

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1. Introduction

- **Building performance analysis:** the evaluation of how a building functions in energy, comfort, structural and environmental terms.
- It informs design decisions to improve efficiency, occupant wellbeing and sustainability.

2. Performance Domains

- **Energy:** heating, cooling, lighting and overall consumption.
- **Thermal comfort:** temperature, humidity and air movement experienced by occupants.
- **Daylighting and acoustics:** natural light quality and sound control within spaces.

3. Analysis Methods

- **Energy modelling:** simulation tools predict consumption and savings (e.g. EnergyPlus, IES VE).
- **Computational fluid dynamics (CFD):** models airflow and ventilation.
- **Post-occupancy evaluation:** measures real performance after the building is in use.

4. Metrics and Benchmarks

- Common metrics include energy use intensity (EUI), U-values and daylight factor.
- Rating systems such as LEED, BREEAM and Energy Star benchmark performance.
- Lifecycle assessment evaluates environmental impact over time.

5. Applications

- Guides design choices on orientation, envelope, glazing and systems.
- Supports compliance with energy codes and green certification.
- Reduces operating costs and carbon emissions across a building's life.