



Building Energy Modelling Course: EnergyPlus Simulation, Baseline and Proposed Models



Building Energy Modelling Course: EnergyPlus Simulation, Baseline and Proposed Models

Introduction:

Building energy modelling with EnergyPlus simulation, baseline and proposed models is a 5-day course for mechanical engineers, energy modellers, sustainability consultants and architects, ending with a baseline versus proposed model comparison report for a case office building. Design teams often receive simulation results they cannot check, so envelope, glazing and HVAC decisions rest on faulty zoning, schedules or weather inputs. Nominees already design building services or facades and work hands on in simulation labs with EnergyPlus, OpenStudio and IES VE. CoreConcept Training Center delivers this building energy modelling course.

Course Objectives:

- Select the energy model type, simulation engine and weather file suited to concept design, compliance or retrofit questions
- Build geometry, thermal zones, constructions, internal loads and schedules that reflect design documents and are recorded in an input log
- Model HVAC air and plant loops and configure baseline and proposed models under the ASHRAE 90.1 Appendix G performance rating method
- Run parametric studies and daylighting control simulations to compare design options on annual energy and peak loads
- Check results for unmet hours, sizing and input errors and calibrate existing-building models against metered data using ASHRAE Guideline 14 metrics
- Produce a baseline versus proposed model comparison report for a case office building with compliance tables and a rating credit energy summary

Target Audience:

- Mechanical and HVAC engineers responsible for load calculations, system selection and the energy performance of building services designs
 - Energy modellers responsible for building, running and documenting simulation models for design teams
 - Sustainability consultants responsible for energy credits, compliance submissions and advice on low-energy design measures
 - Architects and facade designers responsible for massing, glazing and envelope decisions tested through simulation
 - Retrofit and facility engineers responsible for upgrading existing buildings with models checked against meter readings
-

Course Outline:

Day 1: Energy Model Purpose, Simulation Engines and Input Foundations

- Energy Model Types for Concept, Design, Compliance and Retrofit
- EnergyPlus, OpenStudio and IES VE Workflow Comparison
- EPW Weather Files and Typical Meteorological Year Selection
- ASHRAE Standard 140 Software Testing and Engine Limitations
- Model Input Register and Assumptions Log Setup

Day 2: Geometry, Thermal Zoning, Constructions and Internal Loads

- Building Geometry Import from BIM and Simplification Rules
- Thermal Zoning by Orientation, Perimeter Depth and Space Use
- Opaque Construction Layers, Thermal Bridging and Glazing Properties
- Occupancy, Lighting and Plug Load Density Inputs
- Hourly Schedules, Thermostat Setpoints and Infiltration Rate Assignment

Day 3: HVAC System Modelling and the Appendix G Performance Rating Method

- HVAC Templates Versus Detailed Air and Water Loops
- Chiller, Boiler and Fan Performance Curves in Plant Loops
- ASHRAE 90.1 Appendix G Baseline System Selection Rules
- Proposed Design Model Inputs Matching Design Documents
- Baseline Building Rotation, Envelope and Lighting Power Rules

Day 4: Parametric Optimisation, Daylighting, Results QA and Calibration

- OpenStudio Measures for Parametric Runs and Sensitivity Analysis
- Daylighting Controls Coupling with Lighting and Cooling Loads
- Unmet Load Hours, Sizing Errors and Results QA Checklist
- ASHRAE Guideline 14 Calibration Using CVRMSE and NMBE
- Metered Data Alignment for Existing Building Retrofit Models

Day 5: Lab Work on Baseline and Proposed Model Comparison for a Case Office

- Case Office Model Build from Architectural and MEP Drawings
 - Baseline Model Generation and Proposed Model Refinement
 - Energy Conservation Measure Runs and Cost Ranking
 - Compliance Report Tables and Rating Credit Energy Summary
 - Model Comparison Report Completion and Peer QA Review
-

Skills You Will Gain:

- Energy Model Scoping
- Thermal Zoning
- Simulation Input Logging
- HVAC Loop Modelling
- Performance Rating Method Application
- Parametric Sensitivity Analysis
- Simulation Results QA
- Model Calibration

Why Attend This Course:

- Deliver a baseline versus proposed model comparison report to the design lead and the project compliance reviewer
- Decide which envelope, glazing and HVAC options earn their energy savings before drawings are frozen
- Avoid rejected compliance submissions and rework caused by unmet load hours, wrong baseline systems or missing schedules
- Coach design colleagues to read simulation outputs, input logs and QA checklists in a consistent way

Conclusion:

Back at work, the participant gives the design lead and the compliance reviewer a baseline versus proposed model comparison report supported by an input log and a results QA checklist. The design team uses it to confirm envelope, glazing and HVAC choices, to support a code compliance submission and to estimate energy credits under a green rating system. After the first project submission, the team should review reviewer comments, unmet load hours and the gap between predicted and early metered consumption, then update its modelling templates.

Frequently Asked Questions FAQ:

What should participants know before the building energy modelling course?

Participants should understand HVAC systems, building envelopes and load calculations and be able to read architectural and MEP drawings. Prior use of EnergyPlus, OpenStudio or IES VE helps but is not required, and basic familiarity with any simulation interface shortens the first lab session.

How does a building energy modelling course differ from an energy management course?

It teaches how to build, check and report whole-building simulation models for design, compliance and retrofit. Energy management courses cover policy, audits, utility-bill baselines and savings verification, while green building courses cover design strategy and the rating certification process.

Why does building energy modelling compare a baseline and a proposed model?

The comparison isolates the effect of design choices. The baseline represents a code-reference building with standard assumptions, while the proposed model reflects the actual design, and the difference between them is what compliance pathways and rating energy credits assess.

What do participants take back from the building energy modelling course?

Participants take back a baseline versus proposed model comparison report for a case office building, with an input log, a results QA checklist, parametric study findings and a calibration approach they can reuse on their own projects.