

# Energy Modelling

## What is it?

Mathematical modelling of the building's energy consumption to support envelope and HVAC system design.

An Engineer builds a detailed computer model of the building envelope and its energy systems, incorporating climatic conditions and simulating energy performance. The software uses physics equations to calculate thermal loads, system responses and the fuel and electricity consumption of the building.

## Why use it?

### 1 Building Code Compliance

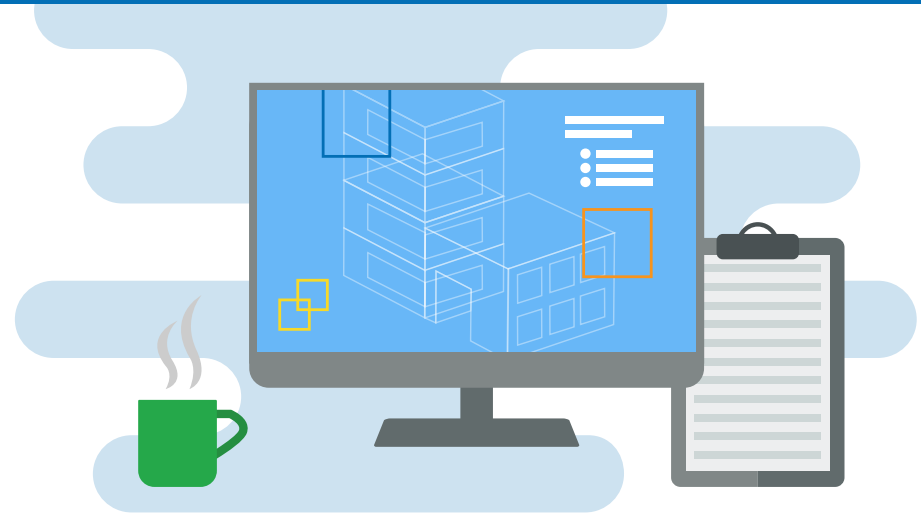
The National Energy Code for Buildings (NECB 2015) offers three paths for compliance: Prescriptive, Trade-Off, and Performance. Of the three options, the Performance path offers the most flexibility in building design. Performance path compliance requires that the overall building energy performance meets or exceeds that of a reference building, which is typically demonstrated through energy modelling.

### 2 Efficiency Incentives

Efficiency Nova Scotia's custom solutions program offers incentives for new buildings to adopt high-efficiency electrical systems. In many cases the energy savings achieved by each efficiency measure must be demonstrated through energy modelling in order to calculate the offered incentive.

### 3 HVAC System Selection

Energy modelling can be used to compare the performance of different HVAC systems in order to optimize the system design.



## What are the limitations?

Due to the complexity of the systems modelled, there are many significant factors that can be difficult or impossible to account for. Properly constructed, highly detailed energy models can be accurate to about +/- 15% of energy consumption. Improperly constructed models or errors in the modelling process can result in significantly reduced accuracy.

Significant sources of error between an energy model and the real building's energy consumption can include:

- a. Construction variances from design
- b. Occupant behaviour (window/door opening, cooking, thermostat set points)
- c. Climate/weather conditions
- d. Equipment performance variation from specifications