

## 1. Summary

This course demonstrates how to conduct a whole building energy model using OpenStudio. The model is a two story office building located in Denver, Colorado. The videos show the full modelling workflow, culminating in the comparison of two HVAC options 1) packaged terminal heat pumps and 2) variable air volume system.

### 1.1 Software

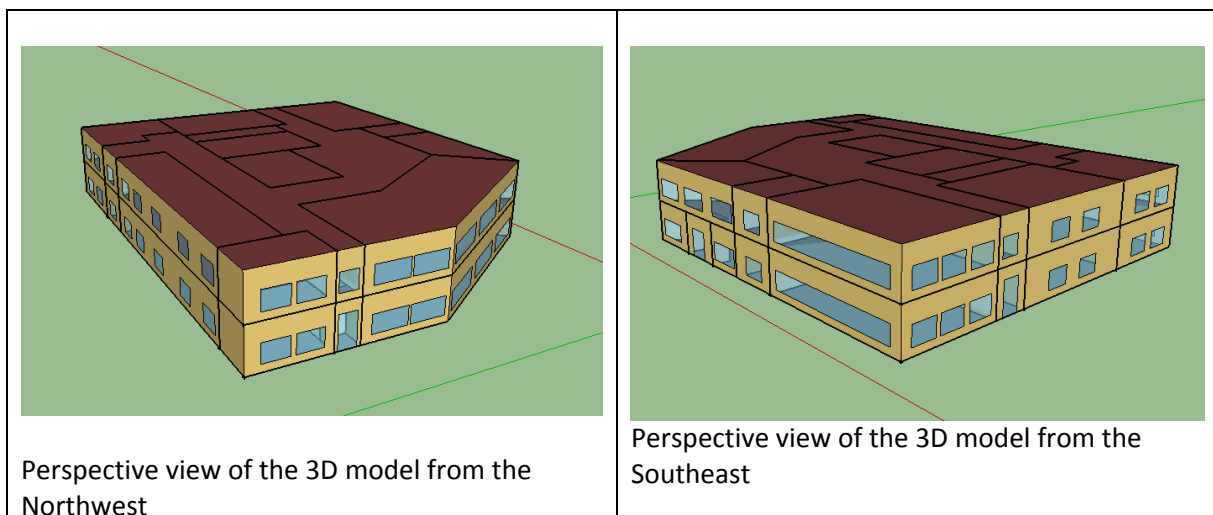
In this course the following software versions are used

- SketchUp (Make) 2015
- OpenStudio 1.9.0
- EnergyPlus v8-3

## 2. Energy Model details

### 2.1 Building Form

The building investigated is a two story office building. The figure below shows two perspective views of the SketchUp model. The plans for the building are included in Appendix A.



*Figure 1 Building form as modeled in OpenStudio with the SketchUp plugin*

### 2.2 Location

The simulated location is Denver, Colorado. The weather file used is the Denver-Stapleton typical meteorological year (TMY) energy plus weather file and the associated design day files.

### 2.3 Schedules

The schedules used in this energy model are taken from template ASHRAE 90.1-2010 Appendix G schedules for a typical office building. These Schedules are available with the OpenStudio software.

### 2.4 Constructions

The constructions used in this energy model are from ASHRAE 90.1 chosen to suit the Denver, Colorado climate zone (5).

- 2.5 Internal Loads and Exterior Lights
- 2.6 Space Types and Spaces
- 2.7 Facility
- 2.8 How to Setup Thermal Zones
- 2.9 HVAC

Two HVAC systems have been compared in this modelling exercise, a packaged terminal heat pump (PTHP) and VAV with hot water reheat (VAV).

- 2.9.1 Adding a PTHP
  - 2.9.2 Setting up VAV with Hot water reheat
- 2.10 Simulation settings

The EnergyPlus thermal calculation engine requires some settings to be selected by the user. In the model the following simulation settings are used

- 2.11 Simulate and view Results