EnergyPlus model for OFFICE CELL- FACTSHEET

SHC TASK 56
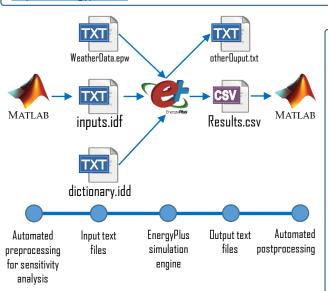
- EnergyPlus (v 8.5)
- TU/e Matlab toolbox

Short description

This set of EnergyPlus and Matlab models can be used as a reference for evaluating solar active systems using simulations. The model set contains the EnergyPlus implementations of the IEA SHC Task 56 typical reference office (See Deliverable DC1 of http://task56.iea-shc.org/publications) and a Matlab/EnergyPlus implementation of the air-to-air heat pump and façade integrated PV model (See Deliverable DC2).

This model set was developed by Samuel de Vries (s.b.d.vries@tue.nl) and Roel Loonen (r.c.g.m.loonen@tue.nl) from Eindhoven University of Technology.

How to install it?

EnergyPlus is a free and open-source simulation platform. More information can be found at https://energyplus.net.

WeatherData.epw · otherOuput.txt

MATLAB · inputs.idf · Results.csv · MATLAB

dictionary.idd

| Automated preprocessing for sensitivity analysis | Input text files | EnergyPlus simulation engine | Output text files | Automated postprocessing |

How is the model structured?

EnergyPlus is a console-based program that is designed to be used via a text-only computer interface. All model specific inputs are assigned via the input data file (.IDF). This file uses a hierarchical class, object, input field syntax. Weather data is assigned using a separate EnergyPlus weather file (.EPW).

The office space is modelled using a single thermal zone. The default EnergyPlus subsystem models were used. A series of EMS programs describe automated solar shading control, ventilation frost protection, and humidistat control using absolute humidity concentrations.
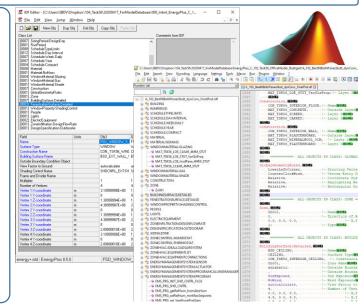
A series of Matlab scripts are provided for pre- and postprocessing. These can be used to report the components of a thermal balance integrated per month, perform sensitivity analyses, and describe an air-to-air heat pump with façade integrated PV system.

How to run and modify the model?

To launch the C_100 and F_300 EnergyPlus simulations, open the EP-Launch application, select the IDF and EPW files and click on "Simulate". Alternatively, a console and the command "energyplus -inputs" can be used. The CSV output results can be post-processed using the "Task56SensibleBalance.m" Matlab scripts.

To change simulation inputs, edit the IDF using a text editor or the IDF-editor. IDF and EPW files have been made available for three locations : Rome, Stuttgart or Stockholm. To modify weather data, change to a different EPW file. A large database of EPW files is available at https://energyplus.net/weather.

To perform sensitivity analyses or a full factorial optimisation study, open the F_300 simulation folder and run the 'makeAndRun' example script. A more detailed description is provided in the 'readMe' file.

Strengths / Weaknesses

- Dynamic single and multi-zone simulation
- High potential for customization of control strategies and HVAC system layouts
- Large variety of detailed and simple subsystem models are available
- A large user-base and active support from the online community

- Wide range of example models are available from the OpenStudio, EnergyPlus directory, and the U.S. Dept of Energy commercial reference buildings database
- Console-based interface requires user expertise
- Graphical user interfaces are (freely) available. Not all features of the provided input files can be imported directly in these graphical user interfaces