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Building Energy Simulations (Part II)

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Learning objectives

1. Perform building energy simulations
2. Visualize results of simulations
3. Co-simulations with a HVAC control system

References

Garg, Vishal, Jyotirmay Mathur, and Aviruch Bhatia. "**Building Energy Simulation : A Workbook Using Designbuilder**". Second edition. Boca Raton, FL ; CRC Press, Taylor & Francis Group, (2021).

How do we perform building energy simulations?
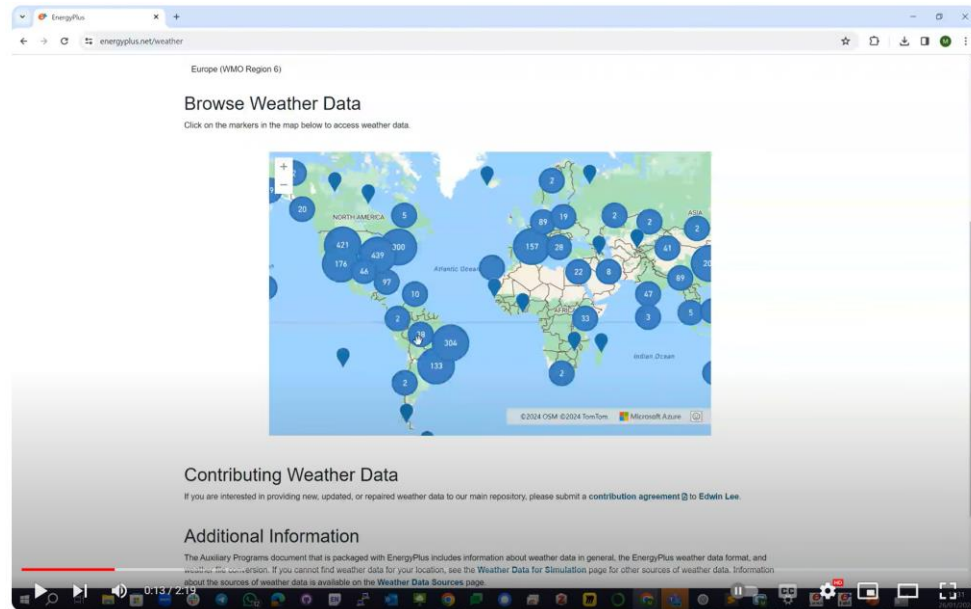
EnergyPlus simulation engine

IDF

Building description

EPW

Weather data

EP-launch

CSV

Simulation results
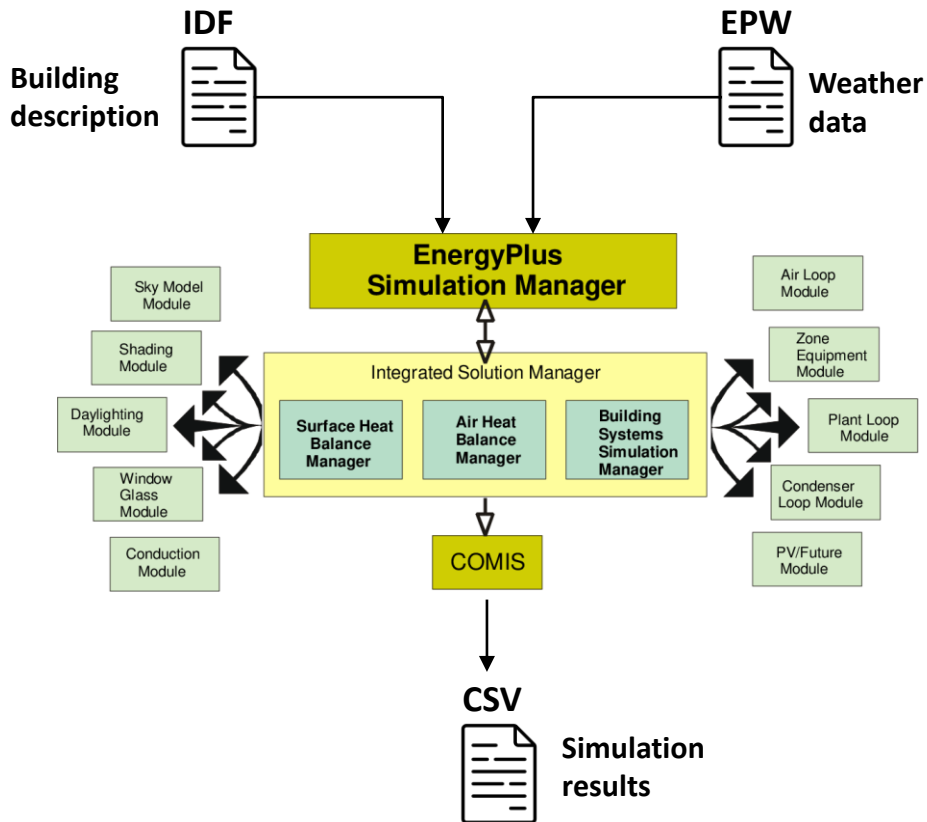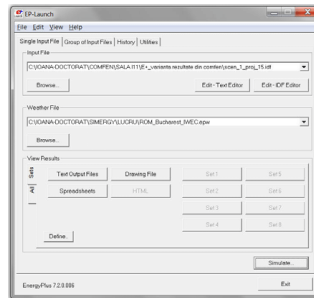
Python code

```
idf_relative_filepath=r'sim\1ZoneUncontrolled.idf'
epw_relative_filepath=r'sim\USA_CA_San.Francisco.Intl.AP.724940_TMY3.epw'#
output_relative_directory='sim'
cl_st=(f'"{energyplus_install_dir}\\EnergyPlus" '
            + '--readvars '  # included to create a .csv file of the results
            + f'--output-directory "{output_relative_directory}" '
            + f'--weather "{epw_relative_filepath}" '
            + f'"{idf_relative_filepath}"'  )
print(cl_st)
```

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Collect weather data

Tutorial EnergyPlus - Collect Weather Data

https://youtu.be/Cn8vhfg8mBA

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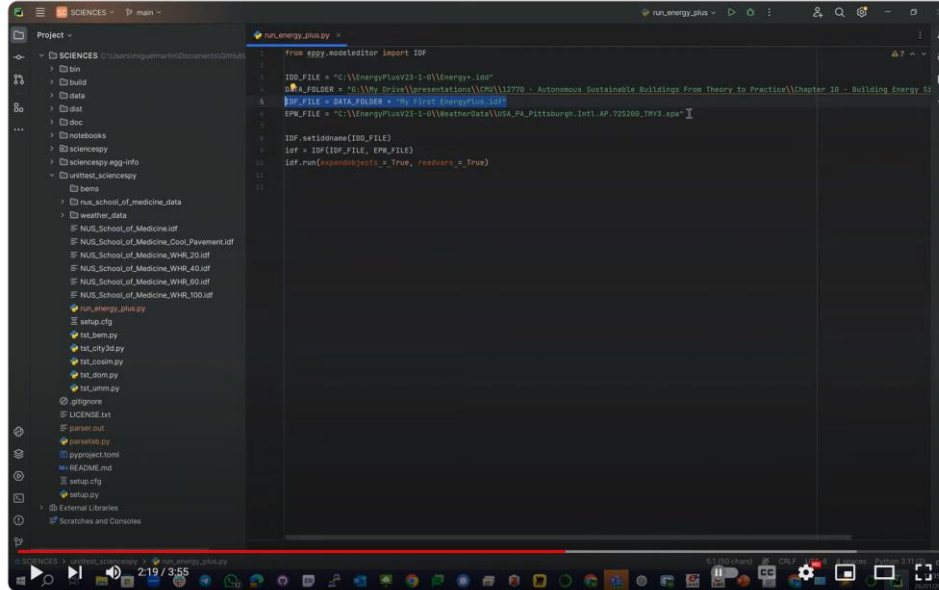
Perform simulations using EP-launch

Tutorial EnergyPlus - Perform Simultions using EP launch

https://youtu.be/sc85BYxloq0
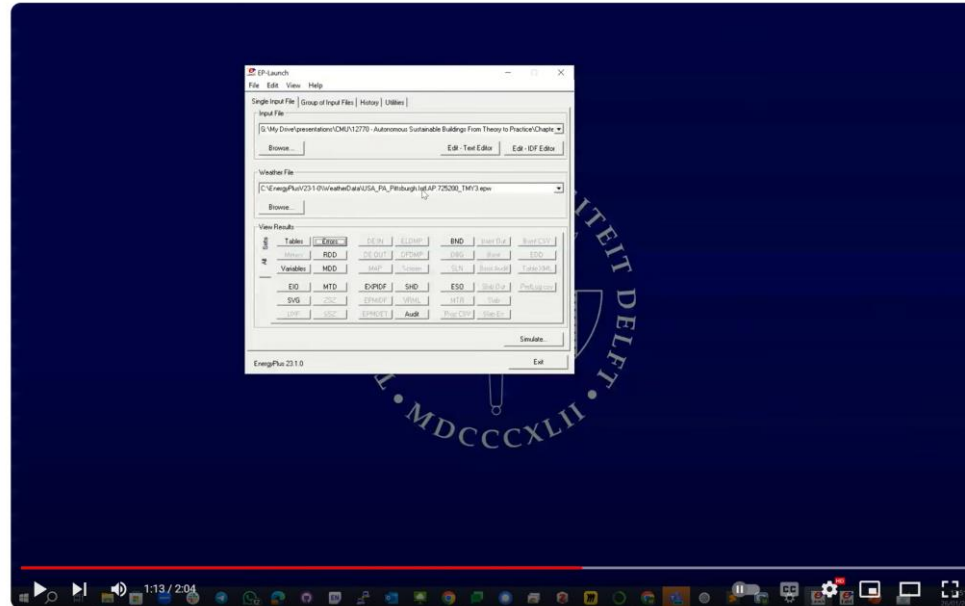
Perform simulations using Python code

Tutorial EnergyPlus - Perform Simultions using Python

https://youtu.be/X6fFSZGPOxE

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How do we visualize results of simulations?

Define output variables

Tutorial EnergyPlus - Define Output Variables

https://youtu.be/FhcLGJsvtt4

Plot the results
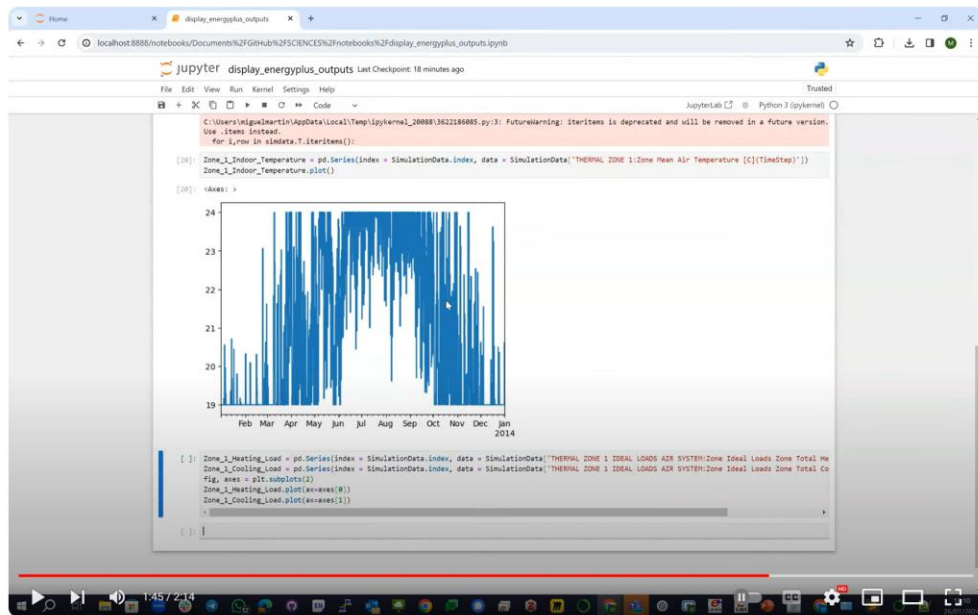
Tutorial EnergyPlus - Plot Outputs of EnergyPlus Simulations using Jupyter

https://youtu.be/SAzmLr638Qc

How do we co-simulate the building energy model with an HVAC control system?

Co-simulation with EnergyPlus using Python

Co-simulation with HVAC control system

Tutorial EnergyPlus - Install Python EnergyPlus Plugin and Co simulate HVAC control system

https://youtu.be/si4sYe9Gktk