

# Energy hub optimization framework based on open-source software & data - review of frameworks and a concept for districts & industrial parks

## Supplementary

The supplementary contains a list of additional references and links for software packages which have been screened above the energy system modelling tools mentioned in [1]. While the framework is proposed on Python-based tools this link collection also contains packages and code snipes realized in other programming languages such as Julia Lang [2]. Some links and references are mentioned in more than one category.

### *A. Infrastructure Details*

<https://github.com/gboeing/osmnx>  
<https://github.com/bwinkel/pycraf>  
[https://re.jrc.ec.europa.eu/pvg\\_tools/en/tools.html](https://re.jrc.ec.europa.eu/pvg_tools/en/tools.html)  
<https://github.com/tudelft3d/3dfier>  
<https://github.com/tudelft3d/Random3Dcity>  
<https://github.com/CalthorpeAnalytics/urbanfootprint>  
<https://github.com/3dcitydb>  
[https://github.com/gioagu/3dcitydb\\_ade](https://github.com/gioagu/3dcitydb_ade)  
<https://github.com/cstb/citygml-energy>  
<https://openenergy-platform.org/dataedit/>  
<https://open-power-system-data.org/>  
<https://energydata.info/>

### *B. Weather Profiles*

[https://github.com/Open-Power-System-Data/weather\\_data/blob/master/download\\_merra2.ipynb](https://github.com/Open-Power-System-Data/weather_data/blob/master/download_merra2.ipynb)  
<https://github.com/oemof/feedinlib>  
<https://github.com/reegis/reegis>  
[https://github.com/MechatronicsBlog/Weather\\_data\\_Python\\_PVGIS](https://github.com/MechatronicsBlog/Weather_data_Python_PVGIS)  
<https://github.com/emilylaiken/merradownload>  
<https://github.com/TUW-GEO/merra>  
<https://gist.github.com/aahoo/b4aaeb179b51b69e342c5e324e305155>

### *C. Renewables Profiles*

<https://github.com/tum-ens/pyGreta>  
<https://github.com/FZJ-IEK3-VSA/RESKit>

<https://github.com/FZJ-IEK3-VSA/windtools>  
<https://github.com/FZJ-IEK3-VSA/tsib>  
<https://github.com/oemof/feedinlib>  
<https://github.com/oemof/oemof-thermal>  
<https://github.com/pvlib/pvlib-python>  
<https://github.com/wind-python/windpowerlib>  
<https://github.com/HotMaps/reslib>  
<https://github.com/PyPSA/atlite>  
<https://github.com/renewables-ninja/gsee>  
<https://data.jrc.ec.europa.eu/collection/id-00138>  
[https://re.jrc.ec.europa.eu/pvg\\_tools/en/tools.html](https://re.jrc.ec.europa.eu/pvg_tools/en/tools.html)  
<https://github.com/LBNL-ETA/MSWH>

#### *D. Building Characteristics*

TABULA ("Typology Approach for Building Stock Energy Assessment")

EPISCOPE ("Energy Performance Indicator Tracking Schemes for the Continuous Optimisation of Refurbishment Processes in European Housing Stocks")

EFFESUS ("Energy Efficiency for EU Historic Districts Sustainability")

Odyssee database (<https://www.indicators.odyssee-mure.eu/energy-efficiency-database.html>)

MURE II ("Mesures d'Utilisation Rationnelle de l'Energie") (<http://www.measures-odyssee-mure.eu/>)

iNSPiRe - D2.1a - Survey on the energy needs and architectural features of the EU building stock

#### *E. Occupations Profiles*

<https://github.com/open-ideas/StROBe>  
<https://github.com/RWTH-EBC/richardsonpy>  
<https://github.com/RWTH-EBC/TEASER>  
<https://github.com/FZJ-IEK3-VSA/tsib>

#### *F. Electricity Demand Profiles*

<https://github.com/FZJ-IEK3-VSA/tsib>  
<https://github.com/oemof/demandlib>  
<https://www.lboro.ac.uk/research/crest/demand-model/>  
<https://github.com/4c656554/pyCREST>  
<https://github.com/RWTH-EBC/richardsonpy>  
[https://www.utwente.nl/en/eemcs/energy/profile\\_generator/](https://www.utwente.nl/en/eemcs/energy/profile_generator/)  
<https://github.com/energy-modelling-toolkit/enlopy>  
<https://eeg.tuwien.ac.at/research/projects/hotmaps>

#### *G. Heating/Cooling Demand Profiles*

[https://github.com/architecture-building-systems/RC\\_BuildingSimulator](https://github.com/architecture-building-systems/RC_BuildingSimulator)  
<https://github.com/FZJ-IEK3-VSA/tsib>

<https://github.com/oemof/demandlib>  
<https://github.com/RWTH-EBC/TEASER>  
<https://github.com/oruhnau/when2heat>  
<https://github.com/tum-ens/urban-heat-pro>  
<https://github.com/architecture-building-systems/CityEnergyAnalyst>  
<https://github.com/architecture-building-systems/RegionalEnergyAnalyst>  
<https://github.com/lbl-srg/MPCPy>  
[https://github.com/nismod/energy\\_demand](https://github.com/nismod/energy_demand)  
<https://github.com/buds-lab/simple-building>  
<https://github.com/ibpsa/modelica-ibpsa>  
<https://github.com/lbl-srg/BuildingsPy>  
<https://github.com/santoshphilip/eppy>  
<https://github.com/openenergy/oppyplus>

#### *H. Demand Clustering*

<https://github.com/FZJ-IEK3-VSA/tsam>  
<https://github.com/PyPSA>  
<https://github.com/tum-ens/pyCLARA>  
<https://github.com/holgerteichgraeber/TimeSeriesClustering.jl>

#### *I. Data Preparation*

<https://github.com/tum-ens/pyPRIMA>  
<https://github.com/RWTH-EBC/uesgraphs>  
<https://github.com/RWTH-EBC/pyCity>  
[https://github.com/RWTH-EBC/pyCity\\_resilience](https://github.com/RWTH-EBC/pyCity_resilience)  
<https://github.com/tum-ens/rivus/blob/master/urbshg15.py>  
[https://github.com/openego/data\\_processing](https://github.com/openego/data_processing)

#### *J. Optimization Frameworks*

<https://github.com/korpuskel91/pomato>  
<https://gricad-gitlab.univ-grenoble-alpes.fr/omegalpes/omegalpes>  
<https://github.com/leonardgoeke/anyMOD.jl>  
<https://github.com/PyPSA/PyPSA>  
<https://github.com/oemof/oemof>  
<https://github.com/FZJ-IEK3-VSA/FINE>  
<https://github.com/switch-model>  
<https://github.com/openego>

#### *K. Simulation Frameworks*

<https://github.com/TStesco/DH-network-simulations>

<https://github.com/openego>

<https://github.com/UMWRG/pynsim>

*K. Results visualization*

<https://github.com/oemof/oemof-visio>

<http://idea.iee.fraunhofer.de:4569/>

<https://model.energy/>

<https://www.energy-charts.de>

<https://github.com/kkroening/ffmpeg-python>

<https://www.geeksforgeeks.org/python-create-video-using-multiple-images-using-opencv/>

*L. Scenario analysis*

<https://github.com/IAMconsortium/pyam>

BIBLIOGRAPHY

- [1] Groissböck M. Are open-source energy system optimization tools mature enough for serious use? *Renewable and Sustainable Energy Reviews* 2019;102:234-248. <https://doi.org/10.1016/j.rser.2018.11.020>.
- [2] Julia [online], *The Julia Programming Language*. Available from: <https://julialang.org/> [accessed 20 January 2021].