windpowerlib and hydropowerlib

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Feed-in time series of RE are the basis for all simulations of future energy systems conducted f.i.

- Grid extension planning
- Estimation of needed backup and storage capacities

Therefore they need to be

- Of high quality
- Transparently generated
- Consistent

Creation of an **open database** containing

- Weather data
- Power plant data
- Other relevant data (e.g. orographie)

With linkage to **open source models** to generate feed-in time series of

- PV
- Wind
- Hydropower

In **collaboration and communication** with the modeler and user community
open_FRED Weather Data

COSMO-CLM

- Global reanalyses data MERRA2
- Area: Germany (generous)
- Years: 2000 - 2015
- Temporal Resolution: 15 min
- Spatial Resolution: 6.642 km (0.061°)
- Validation data needed
open_FRED Weather Data

Data at various heights

- 240 m
- 200 m
- 160 m
- 140 m
- 120 m
- 100 m
- 80 m
- 10 m

- Air Temperature
- Air Pressure
- Air Density

- Maximum Wind Speed of Gust / Turbulence Intensity
- Wind Speed Direction
- Wind Speed
- Surface Roughness Length

Data at various heights
open_FRED Weather Data

Radiation density as half-hourly mean

Direct downward normal radiation

Shortwave Radiation

Longwave Radiation

Direct Downward Normal Radiation

Diffuse Upward Radiation

Upward Radiation

Direct Downward Radiation

Diffuse Downward Radiation

Downward Radiation

Direct downward normal radiation
open_FRED Weather Data

Data serves as input into hydrological discharge model of MPI => Output not yet clear
windpowerlib

• Release of v0.0.5
  • major restructuring to make it more generic
  • added functionalities, tests, power (coefficient) curve data

Important Links

• Source code on Github
  • https://github.com/wind-python/windpowerlib
• Documentation on Readthedocs
  • http://windpowerlib.readthedocs.io/en/latest/

Planned developments

• Generic wind turbines (f.i. for future feedin timeseries)
• Wind farm efficiency / Wind farm power curves
• Generation of time series with time step width of 1 second (for grid calculations)
• Connection to MERRA2 weather data from OPSD
Thank you!