

More than a century of weather- and climate-dependent power supply and demand time series

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Larger share of power supply from variable renewable sources and electrification of end uses

Power systems increasingly more dependent on weather and climate

Need for long-term data at high spatial and temporal resolution



Input data (~ 3 TB)



Meteorological variables

- Wind speed
- Solar radiation
- Temperature
- Runoff

Datasets

- ERA5 (1940-2022)
- EURO-CORDEX (2010-2100)

Other geospatial data

- Population density
- Terrain roughness
- Terrain elevation
- Protected areas
- Land use

Downloading and processing

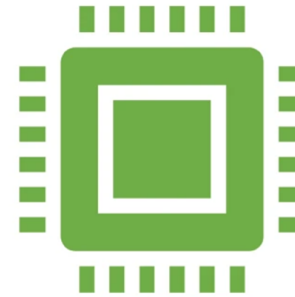


Python scripts via CDS API

Extracting data

Regridding of projected climate data with xESMF

Aggregation



Conversion of meteorological variables to power supply and demand

- Atlite
- Established literature

Aggregation

- Grid cells with 25% top resources
- Drainage basins
- Population density

Calibration with publicly available data

- ENTSO-E
- Eurostat

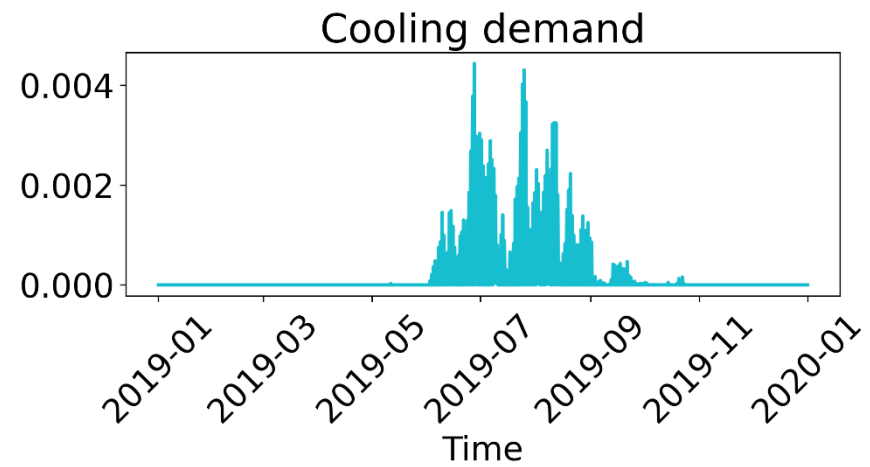
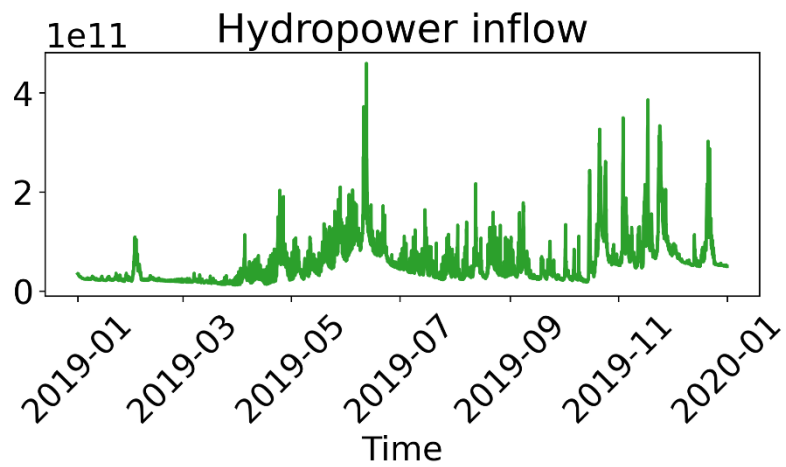
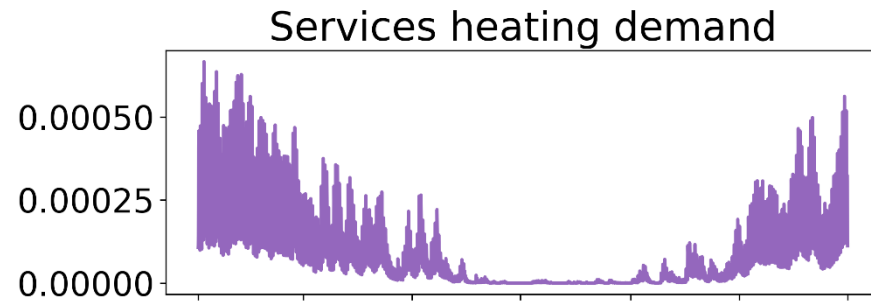
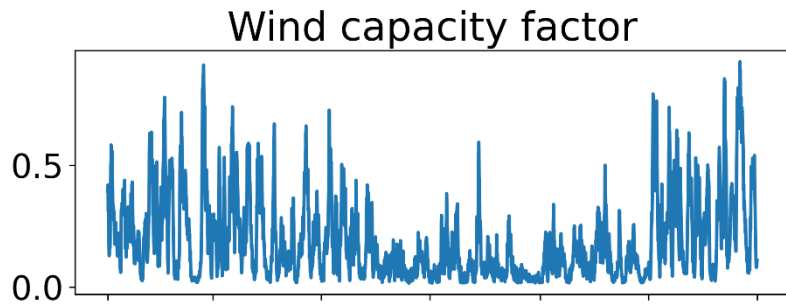
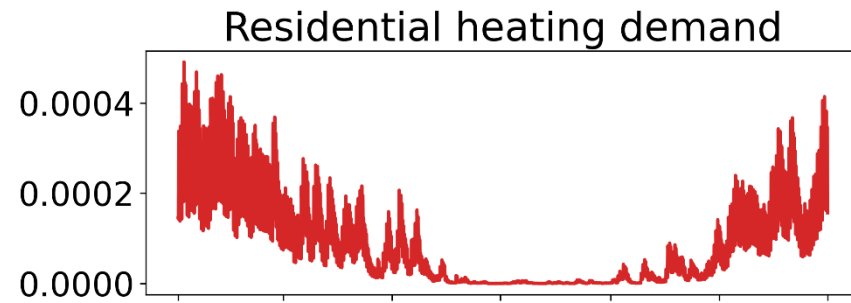
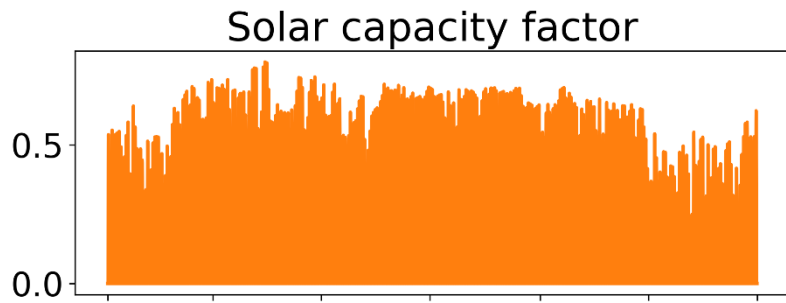
Output data (~ 25 GB)



Country-level time series

- Offshore wind capacity factor
- Onshore wind capacity factor
- Solar photovoltaics capacity factor
- Hydropower inflow
- Heating demand
- Cooling demand





Evaluate impact of climate change on supply and demand

Evaluate resource adequacy and the role of hydropower in a changing climate

Evaluate system robustness to extreme weather and mitigation scenarios



Thanks

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