Master's Thesis

Processing the geographical small-scale effects on renewable energy potentials

Background
As a part of the research project ETSAP-Deutschland, the further development and use of pyGreta program is planned. pyGreta is a tool written completely in python to generate potential renewable energy time-series and maps for user-defined regions within the globe.

Since the used MERRA-2 weather data has very low geographical resolution but is available on hourly basis, correction factors has to be introduced to better represent the small-scale effects. Currently, the correction factors used in pyGreta have a discrete functionality and therefore are not suitable for all regions. Integrating an optimization module makes the tool better equipped for the all topographies.

Goals
Within this Master’s thesis:
- Different datasets for historical weather data such as MERRA, GWA, and ETA etc. will be studied deeply to understand the variations.
- The study focuses only on Wind Energy Potential.
- A better set of correction factors for MERRA-2 data will be suggested that can capture the behaviour of wind for wide scope of regions, either by optimization algorithm or by comparisons with other datasets.

Learning outcomes
By completing this thesis, you will
- obtain knowledge regarding the global wind energy potential
- get an exposure on modelling and geo-referencing in the field of energy systems
- get familiar with the workflow of the research project ETSAP-Deutschland

Requirements
- Basic understanding of the renewable energies
- Knowledge of Python and pandas; Knowledge of GIS tools is preferred (not mandatory)
- Please attach your CV and grade report to your application

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https://github.com/tum-ens/pyGRETA