Masterarbeit
Energy System Modelling: Implementation and Analysis of Dynamic Line Rating into existing Model

Our group maintains the free software toolboxes "Python for Power System Analysis" (PyPSA) and PyPSA Europe (PYPESA-EUR). It is an open optimisation model of the (future) European Energy System at transmission level.

The main goal of the thesis is to integrate dynamic line rating (DLR) into the model. DLR allows the model to increase the capacities of transmission lines when there is a cooling effect from wind or cold weather. It is especially important when considering future renewable scenarios, because renewable feed-in is high when there is much wind, but in those times the transmission grid is the major bottleneck to transport this energy to locations with low yield and high demand. DLR would allow the model to increase the transmission capacity during these periods and to model line congestion more accurately.

Summer thermal ratings usually assume e.g. 25°C temperature and no wind, which is pessimistic in terms of the assumed transmission capacity. Winter ratings can be higher, thus allowing higher power flows. DLR allows the rating to be dynamically adjusted.

This thesis would be in cooperation with Prof. Dr. Brown, who is leading the group "Digital Transformation in Energy System" at TU Berlin, see (https://www.ensys.tu-berlin.de/menue/mitarbeiterinnen/fachgebietsleitungen/), but (mostly) supervised here at the IAI.

Summary of thesis work:
• Implementation of Code (DLR) in Python
• Analysis of Model results with and without own implementation

Requirements:
• Enthusiasm to work on this topic
• Motivation for energy related modelling and simulations
• Programmins skills, preferrably python
• German or English speaking