



Master Thesis

Power Transmission Loss Modelling in European-scale Energy System Optimisation

Fulfilling the Paris climate accords means reaching net-zero carbon dioxide emissions by mid-century. To find the most cost-effective pathways to achieve these targets, researchers build optimisation models of the energy system. Determining where electricity grid expansion is required is an important part of long-term planning, but it adds to computational complexity due to the non-linearity and non-convexity of the power flow equations. A linear approximation is therefore often used, but it usually means neglecting power transmission losses. In this project, you will investigate how considering network losses affects the optimal investment in energy technologies.

Objectives:

- Research literature on (linear) power loss approximation techniques.
- Implement suitable power loss approximations in the Python package PyPSA.
- Compare the performance of different power loss approximations.
- Analyse the effects of considering network losses on optimal system layout.

Personal Qualifications:

We are looking for motivated students interested in energy systems, data processing and numerical optimisation. Basic knowledge in these topics is desirable, as well as experience with object-oriented programming.

Energy System Modelling Group:

We are a young, international and friendly research group that is committed to preventing catastrophic global warming. We look forward to working with you!

Literature:

<https://arxiv.org/abs/1711.00317>

<https://arxiv.org/abs/1611.05953>

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