**MSc Thesis**

Research Question:

1. Upper bound for inefficiencies of incomplete market in deep decarbonisation scenarios.
2. The impact of the degree of incompleteness in under-investments in LDES.

Specific Tasks:

1. Fully complete markets: Optimisation problem (central planner)
2. Fully incomplete markets: ADMM

Test System:

* The GB-greenfield test case will be employed, using a copper plate model (no transmission network – generators and consumers on a single-bus system).
* Ideally, use a dataset of 30–40 weather years. However, initially start with 2–3 weather years. Select extreme and/or typical years (as done in the AFRY report) to ensure adequate variability. Highlight certain years as extreme or typical. So based on what they highlight, we can choose some years to start our ‘toy’ simulations.
* Due to system complexity, reduce data resolution to monthly or quarterly intervals.
* Incorporate elastic demand to address price multiplicity issues, which commonly occur in inelastic demand scenarios. Elastic demand introduces quadratic objective functions. Degeneracy problem refers to the non-improvement of the objective function when changing a basic variable which has a value of zero – RHS=0, (see research by S. Wogrin).

Coding:

* Julia
* GitHub Repository

PSCC 2026:

* Goal: Submit a paper to PSCC 2026.
* Deadline for 1-page abstract: June 1, 2025.

Timeline:

1. GitHub Repository
2. Data analysis (cleaning, pre-processing, selecting representative years, reducing data resolution)
3. Julia optimisation models on generation capacity expansion (<https://github.com/Power-Systems-Optimization-Course/power-systems-optimization/tree/master?tab=readme-ov-file>)
4. Abstract for PSCC 2026
5. Fully complete markets (central planner)
6. Elastic demand
7. Fully incomplete markets (ADMM)
8. In parallel, continue thesis and logbook writing
9. Poster & Presentation after submitting the thesis

Deadline:

29/09/2025

