



University of Stuttgart
Germany

Department for Stochastic Simulation
and Safety Research for Hydrosystems (LS³)

M.Sc. Topic

Renewable energies (photovoltaic, wind, run-of-river) are great, but they are very variable and uncertain. So, if we aim for large shares of these, we need (some) energy storage. But, there are many storages technologies (pumped hydro, reservoirs, batteries...) and they are very different to each other. This makes the decision "in what technology to invest" quite difficult.

To decide the best combination of storage technologies, large optimization problems are formulated. These often take (reeeeeally) long times to solve. But, having a good initial solution (a.k.a. warm-starting the problem) can reduce the time significantly.

In the proposed thesis, different heuristics for warm-starting the optimization will be explored. Their performance can be measured in reduction of computing time. A successful thesis will lead us one step closer to answer *how can storage contribute to a 100% renewable power grid?* Publishing results in a Journal is targeted.

Prospective Tasks

- Literature review of optimization, energy expansion planning, energy storage systems
- Different methods will be programmed in Matlab, including Fourier Transform, Wavelet Transform and Screening curves, among potentially others, for warm-starting an existing optimization program
- Visualization of results and discussion

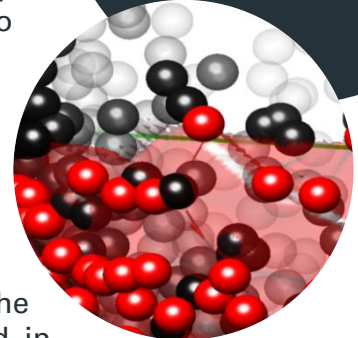
General Information

- Advisors: Jannik Haas and Prof. Wolfgang Nowak
- Theoretic study

Desireable skills

If you enjoy optimization and modelling in Matlab, and of course, love renewable energies, this topic is the right one for you!

How important are *warm-starts* in optimization for energy storage planning?



Apply now!

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