Analysis of methods for a coupled state estimation in low and medium voltage grids

**Bachelor or master thesis**

The energy transition is causing both a decentralization of power generation as well as a transformation in consumer load behavior, e.g. caused by the integration of electro mobility and electrical heat pumps. Especially, distribution grids were however initially not designed for these developments. For this reason, the ability to monitor medium and low voltage grid operation in real time is becoming increasingly important.

The detection of the concurrent grid status is generally done employing a state estimation, which collects several sources of information (measurement data) and combines them. Distribution grids in particular host only a limited number of measurements in present configuration as well as the foreseeable future. Simultaneously, the large number of nodes busses and lines that result only of the combination of a single medium voltage grid with its underlying low voltage grids impedes a mathematically closed solution.

The aim of this thesis is thus an investigation of state estimation approaches for combined medium and low voltage grids. In particular, a comparison of centralized and distributed methods is to be presented.

**Goals and core tasks of the thesis:**

- Literature research concerning distribution grid state estimation approaches
- Comparison of options to deal with limited information and scalability
- Implementation of approaches identified as promising and validation for exemplary grid structures

**Your profile:**

- Study of electrical engineering or business administration and engineering (electrical power engineering)
- Passion for concurrent research and participating in shaping the energy system transition
- Programming skills, especially in Python, are advantageous

**Contact**

**Dominik Mildt**

+49 241 80 - 94937  
d.mildt@iaew.rwth-aachen.de