

MODEL PREDICTIVE CONTROL FOR REAL-TIME CONGESTION MANAGEMENT IN THE GERMAN TRANSMISSION GRID

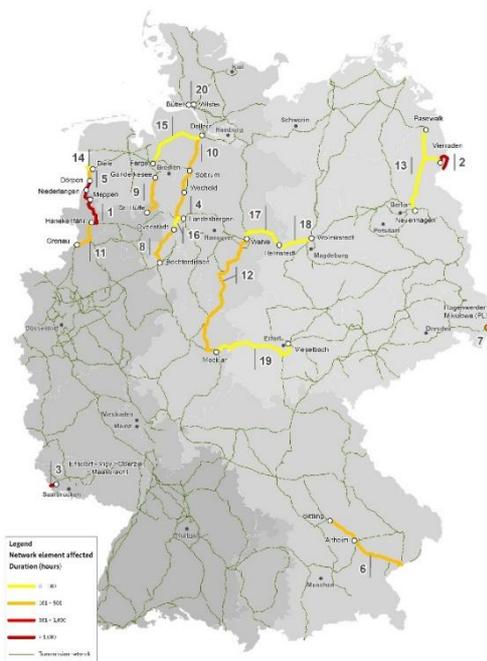


Figure 1: Statistically frequent congestions in the German transmission grid [1]

One of the main responsibilities of a transmission grid operator (TSO) is to guarantee safe grid operation within operational limits. To this end, a TSO continuously predicts grid congestions in the future and derives and implements preventive remedial actions. However, transmission system operation in Germany is increasingly challenged by high shares of volatile renewable generation with associated forecast uncertainty, and a shift of market activity ever closer towards real-time. As a result, congestion patterns can change rapidly and are difficult to efficiently mitigate through remedial actions derived in operational planning alone. Therefore, there is a need to develop computing tools that assist in dealing with grid congestions occurring in real-time.

Master topic: The goal of this master thesis is to develop and implement a Model Predictive Control (MPC) scheme aimed at utilizing new, fast-acting, inverter-based resources to mitigate congestions in real-time. The potential of

the approach will be evaluated in simulation with grid models used in operational planning for the German transmission grid.

Conditions: The master student will be offered a contract with monthly allowance, IT equipment and the opportunity to work at the Transmission Control Centre in Wendlingen.

Your skills: A strong background in systems, control and optimization as well as programming skills (Python/CasADi) are necessary. A working knowledge of German and knowledge of power systems is advantageous.

Supervisors: Prof. Dr. Moritz Diehl, Dr. Armin Nurkanović, Dr. Jochem De Schutter (TransnetBW)

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