

Optimal dynamic operation of a power-to-gas process



As part of the **energy transition**, the German government's climate targets provide for a 95 percent reduction in greenhouse gas emissions in Germany by 2050 compared to 1990. On this path to greenhouse gas neutrality, extensive transformations are necessary in all sectors. As one of the most energy-intensive industries, the chemical industry is particularly affected by this.

Technologies for storing or using surplus electricity from renewable energies in times of oversupply are expected to make a decisive contribution. **Power-to-gas (PtG)** processes are considered a promising solution here. An important step towards the marketability of these processes is the improvement of their dynamic mode of operation.

The focus of this work will be on the **dynamic optimization of a power-to-gas process**. In a first step an existing dynamic model of a reactor for the methanation of CO₂ will be extended and adapted to the requirements of dynamic optimization. The model will then be linked to an optimization tool and optimized under given boundary conditions. Conclusions on dimensioning, operating conditions and feasibility will be drawn from the results.

Tasks

- Modelling of a process engineering system in **Modelica**
- Setting up and solving the **optimum control problem**
- Interpretation and presentation of the results

General conditions

- Master thesis, duration: 6 months
- Insight into industrial practice
- Support at RWTH is possible without problems due to good university contacts
- Strong interest in simulation and thermodynamics necessary

We look forward to receiving your application by e-mail to: jobs@tlk-energy.de