

Master thesis

# Development of a European methanol model in urbs (German or English)

## Motivation and background

The overarching goal of the "H2-Reallabor Burghausen – ChemDelta Bavaria" is the climateneutral transformation of the local chemical industry towards a sustainable hydrogen-based chemistry. This transformation is essential not only to secure the strong position of the chemical industry in the region for the future, but also to contribute to the achievement of Germany's climate and energy policy targets and is supported by a unique collaboration between science and industry.

In the coming years, companies will face important decisions regarding the optimal use of location and the optimal composition of final energy. Electricity will become more important as a final energy source, while new energy sources such as hydrogen will be added, and current processes will be transitioned into sustainable processes. Decisions will depend on expected availability and expected prices, which can only be considered in a European context.

As a partner in the "H2-Reallabor Burghausen"-project, the Chair of Renewable and Sustainable Energy Systems (TUM-ENS) is analyzing the German and European energy and material system with the help of a linear optimization model. This allows us to better understand the impact of the changing systems on the local chemical industry.

## **Research focus**

The master thesis will be focusing on the organic chemical methanol which is used by several companies in ChemDelta Bavaria and aims to provide insights into various research questions, including:

- What are the production volumes and trading streams?
- What is the cost of production per process?
- What requirements need to be in place to achieve the shift to sustainable products?

## Tasks

As part of the thesis, you will develop a specialized <u>urbs</u> model centered on methanol which will help to evaluate the usage of different methanol processes, to analyze the transition to more sustainable e-methanol/bio-methanol and to answer the above-described research questions. The work includes the following steps:

- 1. Development of an overview of areas of applications of methanol today and in the future
- 2. Collection of capacity data and techno-economic data for different methanol production processes
- 3. Setup of the Methanol system in the linear optimization model urbs
- 4. Analysis of different scenarios and implications on the model results
- 5. Techno-economic assessment of the scenarios

Upon the completion of the model, it will be incorporated into the overarching energy and material model used in the project.

Chair of Renewable and Sustainable Energy Systems Department of Electrical and Computer Engineering Technical University of Munich



#### Requirements

- Enthusiasm to develop a thorough understanding of the European methanol market as well as the shift of production to sustainable processes
- Strong problem-solving skills and the ability to work independently in a structured manner
- Experience with Python programming desirable
- Basis knowledge for energy system desirable

## Application

If you are interested in working on this or a related topic, please send your comprehensive application documents, including your CV and transcript of records to Laura Honig (<u>laura.honig@tum.de</u>). Please include your motivation, as well as relevant prior knowledge and qualifications. Feel free to contact me in case of any questions! I look forward to receiving your application!

#### Contact

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