

Master thesis

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

Motivation and background

The overarching goal of the “H2-Reallabor Burghausen – ChemDelta Bavaria” is the climate-neutral 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 compound ethylene 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 across Europe?
- What is the cost of production for different production processes and locations?
- What requirements need to be in place to achieve the shift to sustainable bio-ethylene?

Tasks

As part of the thesis, you will develop a specialized [*urbs*](#) model centered on ethylene which will help to evaluate different ethylene processes, will enable to analyze the transition to bio-ethylene and will allow you to answer the above-described research questions. The work includes the following steps:

1. Development of an overview of areas of applications of ethylene today and in the future
2. Collection of capacity data and techno-economic data for different production processes
3. Setup of the ethylene model 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.

Requirements

- Enthusiasm to develop a thorough understanding of the European ethylene 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 (laura.honig@tum.de). 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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