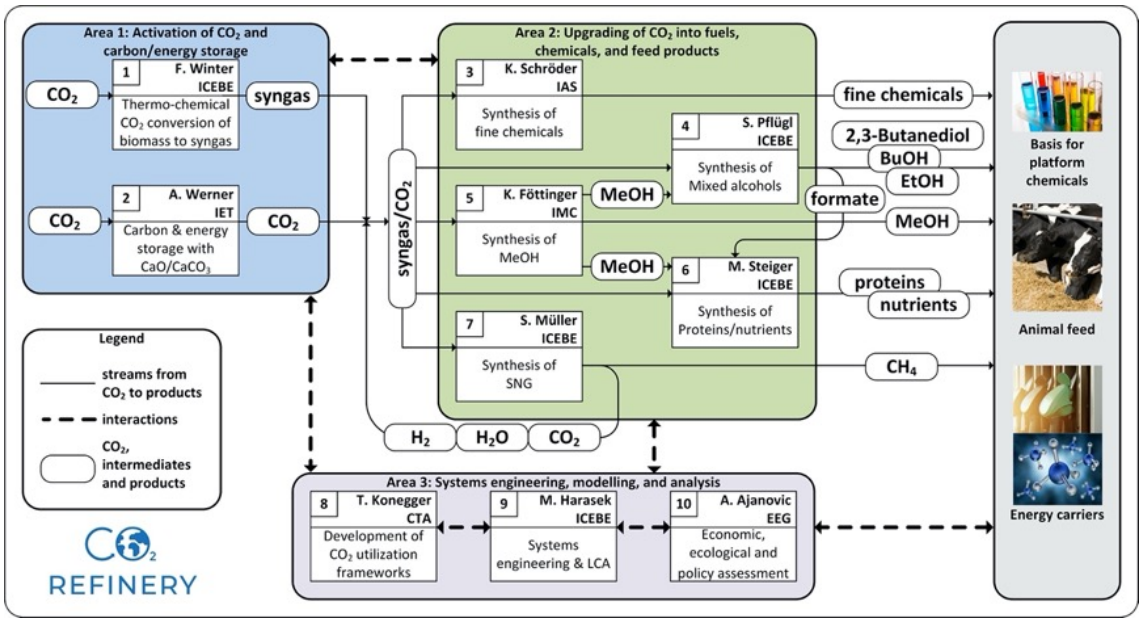
Open Position PhD #10: Economic, environmental and policy assessment of CO_2-derived products

General

The TU Wien doctoral school **CO_2Refinery** covers a wide range of methods and will integrate multiple disciplines required to implement a fully functional facility for refining and upgrading CO_2 on a technical center scale. With its integrated research and training program, the doctoral school targets to train "**one carbon engineers**" will work together on the development of technologies to efficiently utilize CO_2 as a carbon source to make a broad variety of products using chemical and biological catalysts. In addition to synthesis of products from CO_2, **CO_2Refinery** will focus on the activation of CO_2 for utilization as a carbon source in synthesis processes. Moreover, using renewable resources such as biomass and energy, and energy storage with CO_2 as the scaffold will be investigated. The strategy of **CO_2Refinery** is complemented by research on systems engineering, modelling, and analysis to provide the framework of the individual unit operations. Additionally, life cycle analysis will be used as a powerful tool to evaluate performance of the refinery on an economic scale. The research topics are structured into three research areas as shown below.



Within the proposed research framework, the members of the TU Wien doctoral school will be trained interdisciplinary to obtain a unique skillset. Graduates are envisioned to work at the forefront of groundbreaking research, but also to implement the concepts and ideas of a CO_2 refinery in industry. **CO_2Refinery** offers excellent scientific research, combined with a multi- and interdisciplinary curriculum (lectures and lab rotation) and a dedicated supervision and mentoring program. The PhD students are in the center of attention and their training and scientific advancement is the key to a successful implementation of this program. Research training will be obtained through work embedded into high-quality scientific research environments provided by supervisors that are internationally recognized experts in their fields and the close support through junior faculty members.

Project description:

Carbon dioxide utilization for the production of fuels, chemicals and materials has the potential to decrease CO2 emissions and reduce fossil fuel consumption. It is likely that CO2 utilization can be used as a CO2 mitigation tool helping us to reach European emission reduction goals. However, for the broader implementation of this strategy, it is important to reach economic competitiveness of carbon utilization processes, as well as to ensure clear environmental benefits in the whole supply chain.

Key goals and tasks:

Due to the very high and continuously increasing emissions from the transport sector, currently of special interest are fuels produced through the carbon dioxide utilization that can be used for the substitution of fossil fuels in the transport sector. The major goal of this work is to conduct dynamic economic and environmental assessment of CO2-derived biomass-based fuels considering different supply chains and processes. In this context, it is important to analyse the whole process flow, and to obtain energy and emission balances, as well as related investment and operating costs. Finally, an important task is to derive scenarios based on technological learning.

Experience and skills:

We are calling for a PhD-position with special focus on energy economics and biomass. We expect a candidate with interest in modelling energy systems, environmental aspects and energy policies. A technical background with focus on energy issues is favorable.

In addition, the candidate should be interested in writing papers in the field of energy economics and environmental assessment and giving presentations at corresponding international conferences. Knowledge of modelling and data analysis tools (e.g. programs like MATHLAB, GEMIS) and the interest to use these tools is of high relevance. Moreover, this position will also include involvement in supervising master students and teaching on energy economic subjects.

- Master studies in energy economics, technical engineering, renewable energy engineering, or related
- Experience and basic knowledge in modelling and data analysis tools (e.g. programs like MATHLAB, GEMIS)
- Personal skills: independence, creative thinking, team-working, systematic and structured work approach
- Motivation and willingness to take a part in teaching activities

Supervisors:

Amela Ajanovic / Reinhard Haas