

PhD thesis in the field of CO₂ reuse for long-term energy storage

Research area:

In the context of growing energy demand and environmental pressure to reduce global CO₂ emissions, the development of cost-efficient long-term energy storage technologies is required to enhance the deployment of variable renewable energies. Thanks to their high energy density, liquid fuels like methanol or DME offer an easy way to store and transport energy and thus to compensate for interseasonal fluctuations in the renewable energy production. They could also contribute to the decarbonisation of the transportation sector. Power-to-fuel technologies describe the combined CO₂ capture (from flue gas or from the air), water electrolysis and fuel synthesis that offer a sustainable route to CO₂-sourced liquid fuels (see Figure). First commercial applications of the power-to-fuel technology have emerged recently. However, the conversion efficiency remains low and the process needs to be further integrated and intensified in order to improve its economics.

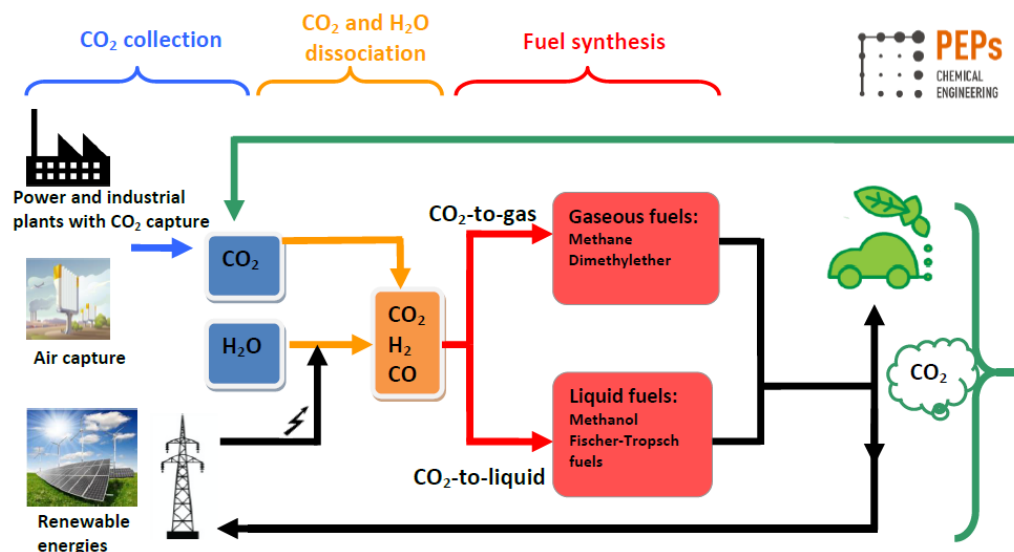


Figure 1: CO₂ re-use for synthetic fuels

Description of the job:

In this position, the PhD candidate will have to fulfill research and teaching tasks. On the research side, he/she will first review the literature about power-to-X and CO₂ re-use technologies. The candidate will work on the design and construction of an experimental set-up for CO₂-sourced fuel synthesis, for which numerical models have already been initiated in the research group thanks to master's theses. Modeling

tools (such as Matlab and Aspen Plus) will be used to support the design and planning of experimental tasks.

On the teaching side, he/she will have to help by the undergrad class of Basic Chemistry and Basic Thermodynamics for engineering students. He/she will supervise laboratories and exercise classes, correct lab reports and written exams. The PhD candidate will also need to take part to the activities of the Department of Chemical Engineering.

The successful candidate will receive an assistant position for a 4-year period, starting in September 2018. The grant amount is in accordance with university standards (~1800 €/month, net).

Candidate's profile:

Candidates must have graduated (Master's degree) in Chemical Engineering or similar field (mechanical, environmental engineering...). They should have a strong interest in process modeling (experience with AspenOne software is a plus) and be able to code mathematical models. Interest and previous experience for experimental work is a plus. Ease to communicate in both French (oral) and English (oral and written) is required.

Research environment:

The successful candidate will join a young and dynamic team within the Department of Chemical Engineering of the University of Liège (DCE). The DCE employs about 60 people mostly active in the fields of process engineering and materials science. It performs experimental research activities, as well as studies the modeling and control of physico-chemical and biochemical processes. It targets the development and optimization of innovative materials and processes that are also sustainable and financially viable. The present research project will be conducted in an international-friendly environment (more than 10 different nationalities are present in the DCE), where collaboration and exchanges with foreign universities is encouraged. More information at: www.chemeng.uliege.be.

The DCE is also an active member of the FRITCO₂T platform (Federation of researchers in innovative technologies for CO₂ transformation) at ULiège, and a founding member of the CO₂ Value Europe Association.

Applications containing CV (with at least 1 reference) and cover letter should be submitted by e-mail to g.leonard@uliege.be. Application deadline is July 20, 2018.