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Coach	**Supervisor(s)**	**Funding**
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Low-Temperature Aqueous Phase Production of Sustainable Aviation Fuels from Biomass

Aim

Develop a process simulation to convert biomass-derived ethanol to long-chain saturated compounds.

Justification

The aviation sector contributes 14% of the CO_2 emissions associated with transport in Europe, yet, it will continue to rely on energy-dense liquid fuels for the foreseeable future. It is hence imperative to develop sustainable alternatives.

Jet fuel produced from plant-derived sources is an essential step in mitigating the GHG emissions associated with the aviation industry[1]. There are a wide variety of processes which convert plant-derived sources, including lignocellulose, to jet fuel[2]. However, all of these technologies are either very energy demanding because of the process conditions or the costly separation step.

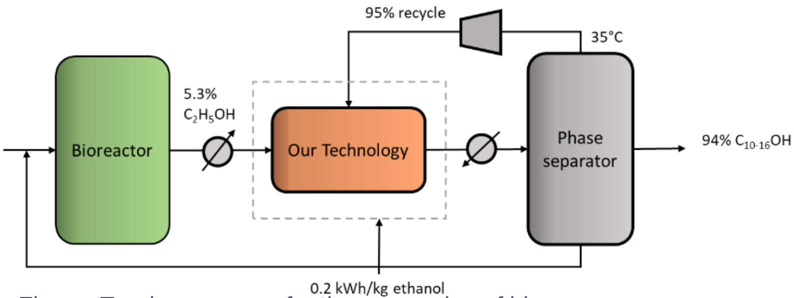

Figure: Tandem process for the conversion of biomass to liquid sustainable aviation fuels.

In this project, we will build Aspen models for different process routes to produce sustainable aviation fuels from CO_2, H_2 and syngas (Figure) under development at the LCT, and benchmark them against commercial SAF routes.

These routes combine biotechnology, electrocatalysis, thermal catalysis and plasma catalysis in different combinations. The project aims to evaluate and compare the viability and sustainability of the different integrated processes through process simulation, optimization, techno-economic assessment, and carbon emission calculations. The models will be refined by experimental data obtained at the LCT and by our collaborators.

Program:

1. Literature review: routes to sustainable aviation routes.
2. Construction and expansion of basic process models.
3. Refinement of the models with kinetic data from our lab and from collborators – identification of process bottlenecks.
4. Techno-economic assessment and CO2 reduction potential of the different routes.

(1) Klein-Marcuschamer, D.; Turner, C.; Allen, M.; Gray, P.; Dietzgen, R. G.; Gresshoff, P. M.; Hankamer, B.; Heimann, K.; Scott, P. T.; Stephens, E. Technoeconomic analysis of renewable aviation fuel from microalgae, Pongamia pinnata, and sugarcane. *Biofuels, Bioproducts and Biorefining* **2013**, *7* 4, 416-428.
(2) Güell, B. M.; Bugge, M.; Kempegowda, R. S.; George, A.; Paap, S. M. Benchmark of conversion and production technologies for synthetic biofuels for aviation. *Norway: SINTEF Energy Research* **2012**.