

HBKU Thematic Research Grant 2nd Cycle– Project Highlight

Project Title: Sustainable aviation fuel from Direct CO₂ capture and Green Hydrogen (SAF-DAC-GH)



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Executive Summary

Alternative fuels, such as sustainable natural gas and green hydrogen are gradually replacing the fossil-based fuels in automotive and maritime transportation. To find a similar substitute for the aviation industry has been challenging, aircrafts are still powered by fossil-based kerosene. Sustainable aviation fuels (SAF), which derive carbon feedstock from either biomass, sustainable methane, or carbon dioxide, are the only realistic alternatives. However, the most realistic source of carbon for the world-scale production of SAF is via CO₂. The production of (MeOH)/ (DME) from CO₂ is one of the most mature technologies for CO₂ utilization, the alcohol conversion to jet fuel is a multi-stage technology. In the conventional route, at least two steps. However, there is an attractive opportunity to reduce the number of transformation steps by reacting DME directly with the fossil-cut, a step that has the capacity to reduce OPEX and CAPEX of the process. In this study, we plan to develop the LCA and the techno-economics of newly developed SAF, which involves the analysis of using direct air capture of CO₂ as a feedstock, methane pyrolysis, and then compare the newly developed with conventional SAF production routes.

Expected Outcome

- A feasibility study report (utilities, preliminary economics, GHG emissions, benchmarking)
- Intellectual property landscape report on e-SAF production routes.
- Report on catalytic results and possible catalyst systems
- A report on the techno-economics and policy development of SAF production process.

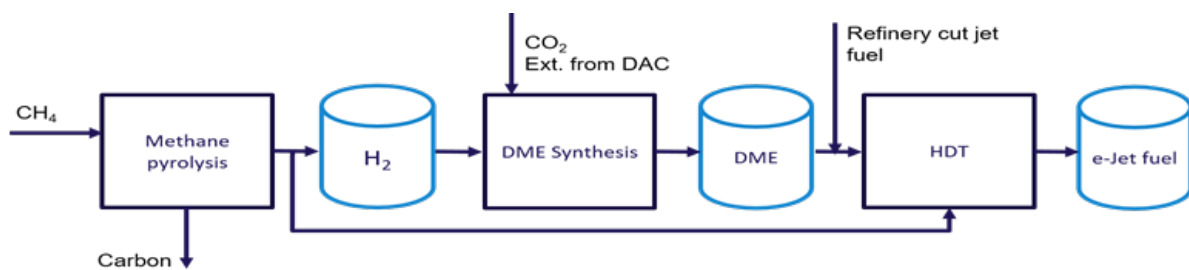
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Schematic:



SAF Innovative Production Approach