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Sustainable Aviation Fuel from CO_2 via Fischer-Tropsch and Mixed Alcohols Synthesis

Biorefineries | Syngas Platform Vienna

Imanuel Wustinger



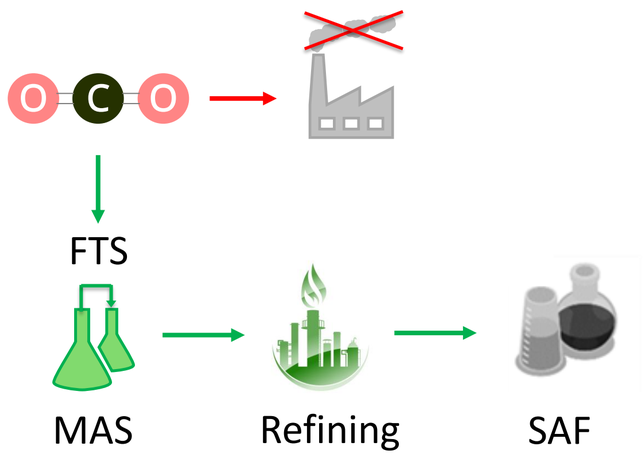
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Topic

The perception of CO_2 is shifting away from a harmful by-product towards a valuable carbon source. This source should be used in areas where carbon-based energy carriers are hard to abate.



As the electrification of aviation will be impossible in the near future, the need for Sustainable Aviation Fuel (SAF) is acute. Fischer-Tropsch (FTS) and Mixed Alcohol Synthesis (MAS) are two promising ways for its production. Therefore, these synthesis routes are being investigated both directly and indirectly in course of this thesis.

Scope

? Development of a lab scale MAS plant
? Experimental parameter variation studies for direct use of CO_2 in FTS and MAS in kg/d scale
? Evaluation of indirect use of CO_2 in FTS and MAS
? Identification of ideal conversion pathways
? Scale-Up of selected pathways

Key Facts

- **University:** TU Wien
- **Duration:** July 2025 – December 2027
- **Mentor:** Gerald WEBER
- **Supervisor:** Matthias KUBA, Hermann HOFBAUER

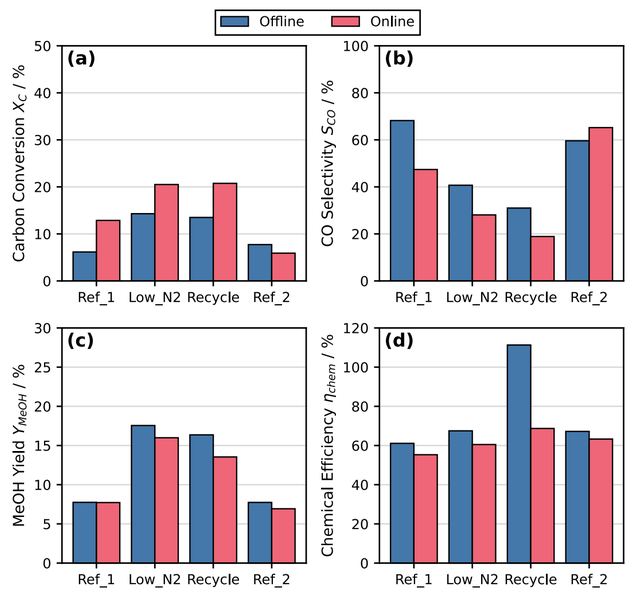
Results

Alcohol Synthesis



Mixed Alcohol Synthesis Plant

For experimental investigation, a lab scale MAS plant needed to be designed and constructed. After Commissioning in June 2026, a first campaign using a commercial methanol synthesis catalyst had been completed by August 2026.



First CO_2 to MeOH Results

Plant Facts

- **OP max:** 200 bar(g)
- **OT max:** 300 °C
- **Flow rate:** 2 – 7 Nm^3/h
- **Recycle:** up to 100%
- **Flexible reactor system, volume:** 3 x 0,6 l
- **Suitable for PtL and BtL investigations**

Fischer-Tropsch Synthesis

The indirect utilization of CO_2 via reverse Water-Gas-Shift (rWGS) in FTS has recently been successfully demonstrated in a campaign lasting four weeks. For this, BEST's lab scale FTS plant had directly been coupled with the rWGS plant of a partnering start-up company.

Outlook

→ **Q1 2027** Experimental campaign using a novel catalyst for CO_2 based FTS
→ **Q1 – Q2 2027** Publication of a journal paper on recent experimental rWGS-FTS campaign
→ **Q2 – Q3 2027** Experimental campaign using a novel catalyst for CO_2 based MAS

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