Feedstock & Conversion

Introduction

This factsheet summarizes the findings of an online seminar, organized by AMF TCP Task 63 on Sustainable Aviation Fuels (SAF) in November 2022. Several challenges still hinder the market introduction of SAF and the market is only growing slowly. The aim of the seminar was to highlight best practice examples for the market uptake of SAF in terms of feedstock and conversion.

SAF opportunities in Brazil

The moderator Paula Isabel da Costa Barbosa (EPE) opened the seminar with an introduction of IEA AMF and the speakers. The first presentation on SAF opportunities in Brazil was given by Donato Aranda (Federal University of Rio de Janeiro). Brazil has a long history with biofuels production, especially with bioethanol production, but also biodiesel. The regulatory framework is supportive. Besides HEFA, the Alcohol-to-Jet pathway is very promising for Brazil. The average production cost for SAF is estimated with 0.50€/l, which is competitive to fossil Jet-A1. The biggest share (> 85%) of costs is due to feedstock costs. With an input of about 165,000 t/a of hydrous ethanol (and hydro-gen), about 100,000 t/a SAF can be produced, with water as a by-product. Hydrogen can be produced from biogas, which have a huge potential in Brazil.

Potential and challenges of technologies for SAF production and commercialization status

Subsequently, Susan van Dyk (University of British Columbia) presented potential and challenges of technologies for SAF production and commercialization status. The presentation covers a report written for IEA Bioenergy Task 39. SAF is essential to reduce emissions from aviation. Currently, pro-duction is low, but many new facilities are planned or under construction. IATA plans net-zero aviation by 2050, the estimated volume of SAF needed to achieve this target are > 400 billion liters. This would require construction of 5,000 to 7,000 new facilities by 2050.

Main challenges for market uptake are slow technology scale-up, high costs, low availability of sustainable feedstock and SAF and lack-ing of adequate policy support. HEFA is currently the main pathway, but until 2030 also Gasification-FT and ATJ will produce significant amounts. PtL will take longer to be fully commercial. However, all SAF technology pathways are needed to achieve the targets of the sector. The development of SAF is driven by policies. Major policies are the ReFuelEU Aviation (EU) and the Inflation Reduction Act (USA). Policies will be critical to bridge the price gap between SAF and fossil Jet-A1.

Vertical integration for SAF and HVO production in Brazil

The final presentation addressed vertical integration for SAF and HVO production in Brazil and was held by Andréia Almeida (Brasil Biofuels). The operations of Brasil Biofuels include the generation of renewable energy and biofuels originated from oil palm cultivation in degraded areas in the Amazon region. Energy is produced and distributed in isolated systems, with no access to the national power grit.

An agricultural zoning initiative mapped all areas which are suitable for sustainable oil palm cultivation, considering only areas which have been deforested before 2007 (31 million hectares). Brasil Biofuels are reforesting these degraded areas and cultivate oil palm. For each hectare of oil palm cultivation, another hectare is needed for cultivation.

Brazil consumes about 7 billion liters of aviation fuel per year. The transition to SAF is relevant, since Brazil committed to CORSIA. There is a production of about 500,000 t/a of vegetable oil on 100,000 hectares planned. The project is also positively contributing to socio-economic development through e.g. cooperation with the Family Farming Program. The investment for the biorefinery (not including e.g. soil preparation) is about 400 million USD. The biorefinery is planned to start production in 2025.

Key findings

- Oil palm plantations close to the Amazon region raises concerns, but Brasil Biofuels is only cultivating on degraded lands, which have been deforested before 2007 and take a lot of effort to prepare the soil
- SAF is essential for the aviation sector, hydrogen or e-fuels will need decades to have a significant impact
- The decarbonization targets are ambitious and hard to achieve, but the development of the sector is impressive and a lot of actors are working together.
- Recordings and slides of the seminar are available at: AMF (iea-amf.org)