IEA-Advanced Motor Fuels

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TASK 63

Technology Collaboration Programme
by iea

Task 63: Sustainable Aviation Fuels

Project Duration	November 2021–April 2023
Participants **Task sharing** **Cost sharing**	Austria, Brazil, China, Denmark, Germany, Switzerland, USA
Total Budget	EUR 200,000 (USD 216,848)
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Purpose, Objectives and Key Question

Sustainable aviation fuels (SAFs) have the potential to reduce greenhouse gas (GHG) emissions from the aviation sector. However, this potential remains largely untapped because such fuels currently represent only 0.05% of total jet fuel consumption. The aim of Task 63 is to lay the foundation for collaborative research, development, and demonstration (RD&D) work on SAFs within the AMF TCP. Thus, the Task focuses on identifying stakeholders and experts, assessing the national situations of the participants, and facilitating information exchange regarding the primary obstacles to adopting SAFs. The Task will address biofuels as well as e-fuels.

Activities

Activities associated with Task 63 include a comprehensive description of the international status of SAFs, an analysis of the concrete situation in some Task member countries, highlighting of best practice examples, and identification of international stakeholders.

Status quo

- Approved technology pathways and those in the ASTM certification process: description of certified technologies and those for which certification applications have been submitted, feedstocks and products, technology readiness levels (TRLs), production costs, and GHG emissions over the life cycle of the technology.
- Production facilities: overview of facilities in operation, under construction, or planned; current and projected production capacities; and technology providers.
- Application of SAF: airports that supply SAFs, airlines that use SAFs, announced supply agreements, announcements by aircraft manufacturers.
- Legislation: national and European Union (EU) commitments and international announcements and agreements.
- SAFs in the energy system: global demand, relation to other transport sectors and other energy-intensive sectors, and projected development.

National assessments

- Identification of current and potential national actors from research, industry, and administration along the value chain (e.g., feedstock suppliers, conversion technologies providers, aviation fuel suppliers, aviation fuel consumers, aviation original equipment manufacturers [OEMs], energy providers, bioenergy research centers, academia).
- Qualitative assessment of the national feedstock potential (considering competing use and trade) for the production of SAFs from biomass, wastes, residues, and electrolysis hydrogen and comparison of production potential with demand.
- Analysis of national strengths based on raw material availability, technological expertise, and willingness to implement on the part of the actors involved.
- Analysis of the current legal framework and announced new regulations with regard to their impact on national climate targets.
- Identification of challenges and opportunities along the value chain with regard to the market introduction of sustainable aviation fuels.

Best practice examples

- Compilation of jointly selected examples of successful production and application of SAFs so that other stakeholders in the field (e.g., airports, airlines, kerosene providers) can learn from them.
- Presentation of best practice examples through a series of three online seminars with different thematic focus (Feedstocks & Conversion, Supply & Operation, and Markets & Policy) during which successful actors will describe how they have implemented the production or application of SAFs, the challenges they have faced, and the strategies they implemented to overcome them.
- Posting of the seminars, as well as the presentations, online to make their findings as accessible as possible.
- Summary of the lessons and recommendations for action derived from the examples in a report. Preparation and sharing of best practice fact sheets online.

Key Findings

Because Task 63 lays the foundation for collaborative research, the findings were broad rather than specific. Key findings of Task 63 include the following:

- The primary barriers for implementing SAFs include (1) feedstock limitations, as well as competition with other sectors for certain feedstocks and certain regions; (2) high production costs and, due to limited market capacities, significantly higher market prices for SAFs compared with conventional jet fuel, and (3) a lack of clear international regulations and alignment between them (e.g., EU Emissions Trading System [EU-ETS] and Carbon Offsetting and Reduction Scheme for International Aviation [CORSIA]).
- Biogenic SAFs are essential for decarbonizing the aviation sector, especially in the short term. The hydroprocessed esters and fatty acids (HEFA) process is currently the main pathway, but until 2030, gasification with a subsequent Fischer–Tropsch synthesis (gasification-FT) and alcohol-to-jet (ATJ) will produce significant amounts of SAFs. The power-to-liquid (PtL) process will take longer to be fully commercial. However, all SAF technology pathways are needed to achieve the targets of the sector.
- Scaling up SAF capacities requires huge investments and risk sharing among stakeholders. Offtake agreements are one possibility for airlines to support SAF producers while securing their SAF supply. The number of offtake agreements has increased sharply in recent years, and this trend is expected to continue.
- SAF availability is very limited at the moment, but the EU and USA for example have very ambitious plans for capacity increase (e.g., ReFuelEU Aviation, U.S. Aviation Climate Goal). Worldwide, there are six production facilities in operation, with Neste as the market leader. In the USA, the production forecast for 2027 is about 60 times higher compared with 2022 levels.
- Although the EU shares a common (proposed) framework, strategies among member states vary (e.g., strong focus on e-fuels in Germany and Denmark).
- SAF blending is not a technological issue (even in the case of multi-blending), but an administrative one. There are three methods for SAF delivery: segregated delivery, mass balance, and book and claim. While the book and claim mechanism seems the most practical, it does not support reducing regional non-CO_2 effects.

Main Conclusions

Although SAF production technologies (other than hydrotreatment) have yet to be further developed and deployed, neither production technology nor technical issues when operating aircraft on SAF is seen as the main challenge. Implementing SAF use is primarily an economic challenge, rather than a technical one.

Publications

- Final report
- Key messages
- Presentations of national workshop (German)
- Recordings and presentations of online seminars
- Presentations of international workshop