Information sheet – Online seminar 1/10 **Task 66: Recent Progress in SAF Research**

Enabling the utilization of SAF blends up to 100%

This information sheet provides a brief overview on the topic of the first workshop of the IEA AMF Task 66 free online seminar series on “Recent Progress in Sustainable Aviation Fuels (SAF) Research”. This workshop highlights research activities in the field of SAF utilization in blends up to 100%.

Introduction

The aviation industry is responsible for around 2% of global greenhouse gas (GHG) emissions, and with air travel expected to grow steadily in the coming years, it is vital to find ways to reduce its environmental impact. SAF offer a promising solution as they can be used as a drop-in replacement for the conventional fossil jet fuel Jet A-1, meaning they can be used in existing aircraft engines without the need for modifications. In addition, SAF have the potential to significantly reduce GHG emissions and non-CO_2 emissions compared to Jet A-1. As non-CO_2 factors also affect global warming, SAF could further reduce the climate impact of flights by e.g. reducing soot particle emissions and thus contrail ice crystal formation.

Status of the ASTM certification

ASTM International, the organization responsible for developing fuel standards, currently does not allow the use of unblended SAF. The ASTM D7566 standard specifies the requirements for synthetic jet fuel blending components and sets blending limits for SAF with conventional jet fuel. Some SAF production pathways are approved for blending up to 50% (FT-SPK/A, HEFA-SPK, ATJ-SPK, CHJ), while other pathways have even lower limits of 10% (SIP, HC-HEFA-SPK, HEFA co-processing) and 5% (other co-processing). Due to the ambitious target of the aviation sector to emit net-zero GHG emissions by 2050, there is increasing interest in the use of SAF blends above 50% and even the use of unblended SAF. Several SAF production processes are currently under evaluation by ASTM, some of them aiming for the production of a range of hydrocarbons that fully replicate Jet A-1, as to enable the use of high blends of SAF up to 100%. ASTM has installed Task Forces to address this matter.

Research activities

The term SAF is an umbrella term for a range of aviation fuels, the exact composition of which varies due to differences in e.g. production technology and feedstock. The maximum blending limit is defined by the compositional similarity between SAF and Jet A-1. Some technology pathways result in the production of fully formulated jet fuel (e.g. FT-SPK/A), which is achieved by blending synthetic aromatics and synthetic paraffins. Aromatics have been shown to contribute to non-CO2 emissions and thus to global warming. However, they are also essential for ensuring seal compatibility and preventing fuel leakage. Research activities address the use of alternative compounds, such as cycloparaffins. Another research field is to modify or design aircraft for the use of SAF without aromatics. For the purpose of e.g. measuring the effects of multi-blends or flying with SAF without aromatics (e.g. HEFA-SPK), test flights are being conducted.

Test flights with 100% SAF

On a global scale, a number of test flights have already been performed in order to assess the effects of 100% SAF utilization. Examples include:

- Embraer and Pratt & Whitney successfully tested a GTF-powered aircraft with one engine running on 100% SAF without any compromise to safety or performance.
- ECLIF3 was the first project to measure the impact of 100% SAF use to emissions from both engines of an Airbus A350 followed by a chase plane.
- SAF Air Lab is a flight laboratory for SAF to optimize propulsion and test technical innovations as well as the effects of different SAFs on efficiency and emissions.

The utilization of 100% SAF is a complex and multifaceted issue. In order to overcome the technical and regulatory challenges, a coordinated effort will be required from industry, certifiers and researchers. As the aviation industry continues to innovate and develop, the utilization of 100% SAF may become more attainable in the future.

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