58th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

Dhaka, Bangladesh
15 to 19 October 2023

AGENDA ITEM 7: AVIATION AND ENVIRONMENT

PATHWAY OF SUSTAINABLE AVIATION FUEL (SAF) DEVELOPMENT IN INDONESIA

(Presented by Indonesia)

INFORMATION PAPER

SUMMARY

Sustainable Aviation Fuel (SAF) is considered as one of the main baskets of measure to reduce carbon emission from aviation activity. This Paper presents the pathway of SAF development in Indonesia using local feedstock called Bioavtur J2,4 with 2.4% blending of palm oil using co-processing method. This Paper encompasses the background, policy and regulation, progress, challenges, opportunities, and necessary support to escalate the development and deployment of SAF in Indonesia.

PATHWAY OF SUSTAINABLE AVIATION FUEL (SAF) DEVELOPMENT IN INDONESIA

1. INTRODUCTION

1.1 During the 41st ICAO Assembly, the Long-term Aspirational Goal (LTAG) for international aviation was established, aiming to achieve net-zero carbon emissions by 2050 in alignment with the UNFCCC Paris Agreement objectives. This ambition could be reached through three baskets of measure: technology, operational, and fuel. Among these, optimizing the aviation fuel is considered as the most effective method for reducing CO2 emissions, holding the potential to contribute up to 55% of emissions reduction by 2050.

1.2 As an active member of ICAO, Indonesia aims to give contribution in achieving the global collective ambition of LTAG. With its rich resources, Indonesia plans to develop Sustainable Aviation Fuel (SAF) from its own local feedstock to gain benefit such as:

- Significantly decrease aviation emissions.
- Utilize the potential of local feedstock to strengthen self-reliance and fostering regional economic growth.
- Enhance the global supply of SAF, supporting the transition towards a more environmentally responsible aviation.

2. DISCUSSION

SAF DEVELOPMENT IN INDONESIA

SAF Policy Frameworks

2.1 To drive the development and deployment of SAF, Indonesia has established framework of policies:

1. Minister of Transportation Decree No. KM 8 of 2023 – This decree introduces the mitigation actions, including the implementation of Bioavtur / SAF, especially in transport category aircraft for passenger air transport. This decree mandates further research on Bioavtur / SAF production, distribution, sustainability, safety, and risk management.

2. Joint Agreement between DGCA and Directorate General of Renewable Energy and Energy Conservation No. Hk.201/2/7/DRJU. Kum 2022 and No. 11. PJ/KS.01/DJE.S/2022 – The agreement between the Ministry of Transportation and the Ministry of Energy of Indonesia to prepare the roadmap of SAF implementation, including conducting tests and joint evaluation of SAF utilization.

3. Regulation of the Minister of Energy and Mineral Resources No. 12 of 2015 – In this regulation concerning the provision, utilization, and trading of biofuels as other fuels in which Indonesia aims to achieve the implementation of 5% Bioavtur / SAF blending in 2025.

4. Indonesia's State Action Plan to Reduce Greenhouse Gas Emissions from Aviation Sector – The document has reported by DGCA Indonesia to ICAO in 2021 committed to continue the development of SAF using the local feedstock.

SAF Development Progress

2.2 Indonesia put an effort in developing SAF using local feedstock, called Bioavtur J2,4, with 2.4% blending of palm oil. It is a collaboration involving various stakeholders, including the Ministry of Transportation, Ministry of Energy and Mineral Resources, National energy company (Pertamina), research & development organizations (BPDPKS & ITB University), Airlines & MRO (Garuda Indonesia Group) and also national aircraft manufacture (Indonesia Aerospace). The process

involves refining Palm Kernel Oil (PKO) feedstock using co-processing method. Notably, Pertamina has already conducted production tests using its existing facilities, and the Bioavtur J2,4 has been tested in the laboratory, in the engine test cell and in the CN235 military registration aircraft as the detail as follow:

a. Production Test – In December 2020, Indonesia National Energy Company (PERTAMINA) has successfully produced Bioavtur J2,0 and J2,4 from Palm Kernel Oil (PKO) feedstock using the Co-Processing method in its existing facility. In December 2021, one refinery unit has been converted as a dedicated green-fuel production unit, with flexibility to produce fossil fuel, co-processing Bioavtur, and full green diesel (HVO).

b. Laboratory Test – The Bioavtur J2,0 and J2,4 was tested in laboratory confirmed its chemical and physical properties align with the conventional Jet A-1 avtur, meeting the ASTM 1655 standards.

c. Static Test using Engine Test Cell – In May 2021, using engine test cell facility in MRO GMF AeroAsia, static test was conducted using Bioavtur J2,4 in the CFM56-3 engine. Then, in July 2023, another static test was conducted in the test cell CFM 56-7B engine as preparation for the flight test and demonstration using transport category airplane B737-800. The test result show the performance of the engine using Bioavtur J2,4 is as good as using conventional avtur.

d. Ground and flight test using CN235 Aircraft – In September 2021, a significant milestone was reached as the Bioavtur J2,4 was tested on the aircraft for the first time by using military-registered CN235 aircraft manufactured by Indonesia Aerospace. During the test, one wing of the aircraft was refueled with Bioavtur while the other received jet A1. The result of ground test and flight test demonstrated that the aircraft performance was in line with that of conventional avtur.

e. Next plan: Ground Test and Flight test Boeing 737-800 – Follow up the achievements of the ground and flight tests conducted on the CN235 aircraft and the static test in the CFM 56-7B engine test cell; the upcoming initiative involves testing Bioavtur J2,4 in a commercial aircraft, specifically the B737-800 operated by Garuda Indonesia airlines.

f. Next plan: Sustainable Criteria Certification and Market Analysis – Elevating the value of Bioavtur J2,4 and driving its market expansion. The ICAO sustainability criteria must be met. This not only enhances SAF's credibility but also attracts environmentally conscious stakeholders, fostering a thriving market for greener aviation solutions.

Challenges

2.3 In the process of SAF development, Indonesia faced main challenges across various aspects, such as:

1. Coordination between stakeholders – SAF development process requires strong collaboration among various stakeholders such as government, aviation industry (airlines, aircraft & engine manufacturers, airport provider, etc.), fuel providers, research institutions, financial organization, environmental organizations and other relevant stakeholders. Making a dedicated task force and maintaining continues coordination at the national level are considered essential because aligning the interests, priorities, and strategies of these diverse entities is challenging.

2. Technology and infrastructure – Building the facility for research, production, distribution, storage, and utilization of SAF needs high investment in technology and infrastructure. Meanwhile, the limited market and the economic uncertainty become the setbacks to putting in the necessary effort.

3. Funding and Economic viability – The high investment and limited supply drive up SAF prices,

increasing ticket costs and discouraging airline to buy SAF. Limited capacity of government in funding the SAF development pose a significant challenge. Further analysis is needed for designing effective policy, mandate and incentive programs to stimulate growth of supply, creating demand, and enabling market.

4. Certification to meet sustainability criteria – Sourcing the available feedstocks for SAF production that meet the ICAO sustainability criteria through certification process needs more effort and investments. Strong collaboration and capacity building is needed to ensure the readiness of supporting industries from upstream to downstream to provide the overall SAF lifecycle that aligns with the criteria.

5. Capacity building – Differing levels of SAF knowledge among stakeholders hinder collaboration. Capacity building is essential to ensure a common understanding, view, and goals to make the realistic roadmap.

Opportunities

2.4 Despite challenges, there are promising opportunities such as:

1. Regional Demand and Potential – ICAO LTAG's Integrated Scenario 3 (IS3) projects a substantial SAF demand increase to 636 million kL. This offers a significant market opportunity for Indonesia, given its local feedstock availability, positioning it as a potential key supplier for domestic and for nearby countries.

2. Feedstock availability – Indonesia is rich in potential feedstock sources such as palm oil, coconut, Jatropha, waste cooking oil, municipal solid waste, algae, and biomass. Further analysis and planning shall be conducted to explore future potential.

3. ICAO's Role in Financial Connectivity – The strategic role of ICAO to connect with financial institutions globally can be leveraged to support SAF project funding.

4. Exploration of Financing Opportunities – Exploring existing and future funding mechanisms, such as providing incentives, reducing tax, and off-taker scheme, while raising awareness among financial institutions, might stimulate the market and expedite the SAF development.

Necessary Support to Accelerate SAF Development

2.5 Additional support is important to optimizing and expediting the efforts for SAF development. Financial backing and capacity-building initiatives, provided by ICAO through ACT-SAF and by other international entities, play a pivotal role in nurturing research, innovation, and SAF production capabilities. Additionally, collaborative efforts to increase supply and demand for SAF are crucial to stabilize the price. This involves fostering partnerships along the SAF value chain, incentivizing investment in production infrastructure, and creating regulatory frameworks that promote its adoption.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

— END —