



ASSEMBLY — 42ND SESSION

EXECUTIVE COMMITTEE

Agenda Item 16: Environmental Protection – International Aviation and Climate Change

ROLE OF LOWER CARBON AVIATION FUELS (LCAF)
IN CORSIA AND LTAG BASKET OF MEASURES

(Presented by the Qatar)

EXECUTIVE SUMMARY

This working paper underscores the State of Qatar's views regarding the current status of development, production and deployment at commercial scale of Lower-Carbon Aviation Fuel (LCAF), which is 100% drop-in Fuel and appears to be an overlooked alternative jet fuel option to address CO₂ emissions from International Aviation. However, without a defined timeline and tangible progress, there is a risk that this opportunity may be lost. Furthermore, in the absence of prompt and proactive measures to make considerable progress in the LCAF development, production and deployment, there is a strong likelihood that the situation will mirror that of current progress made in Sustainable Aviation Fuel (SAF) under the Long-term aspirational goal (LTAG) Scenario IS1, where progress has been limited.

Action: The Assembly is invited to:

- a) adopt measures to accelerate the development, production, and deployment of LCAF initiatives, aiming to recover the momentum, increase the availability of Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) Eligible Fuels (CEFs) and accelerate the production rates to contribute the LTAG IS3 target; and
- b) allocate resources to assist Member States and scaling up of development, production, and deployment LCAF for supporting the LTAG.

<i>Strategic Goals:</i>	This working paper relates to the Strategic Goal – <i>Aviation is Environmentally Sustainable</i>
<i>Financial implications:</i>	The activities referred to in this paper will be undertaken subject to the resources available in the International Civil Aviation Organization (ICAO) 2025 – 2027 Regular Budget and/or from extra budgetary contributions.
<i>References:</i>	ICAO Assembly Resolution A41-21 ICAO LTAG Report ICAO Global Framework Adopted at CAAF/3

1. INTRODUCTION

1.1 In November 2023 the International Civil Aviation Organization (ICAO) Member States embarked on a challenging journey to decarbonize civil aviation sector by 2050 by adopting the ICAO Global Framework for Sustainable Aviation Fuel (SAF), Lower Carbon Aviation Fuel (LCAF) and other Aviation Cleaner Energies. Achieving the long-term global aspirational goal (LTAG) for international aviation, net-zero carbon emissions by 2050, requires a globally agreed approach consisting of SAF among a basket of measures and a clear roadmap for the implementation of the global framework adopted by the ICAO Conference on Aviation and Alternative Fuels (CAAF/3) held in Dubai, United Arab Emirates,

1.2 In 2023, during the CAAF/3, it was estimated that the total production levels of SAF, LCAF and other aviation cleaner energies fuels were still extremely low (less than 0.2%) in comparison with the total aviation fuel use. The CAAF/3 adopted an aspiration goal to reduce CO₂ emissions in international aviation by 5 per cent by 2030 through the use of SAF, LCAF and other aviation cleaner energies (compared to zero cleaner energy use).

1.3 LCAF is defined in Annex 16 Vol IV as a “A fossil-based aviation fuel that meets the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) Sustainability Criteria, and it is widely recognized as an enabler of carbon neutral growth, as well as a key element to support the CORSIA implementation and SAF deployment. Currently, an LCAF batch can be certified as a CORSIA Eligible Fuel (CEF) if it meets the CORSIA Sustainability Criteria, including a 10% reduction in lifecycle emissions compared to the conventional aviation fuel baseline of 89 g CO₂/MJ. For example, five litres of LCAF could easily provide the equivalent CO₂ emissions reduction of about one Liter of neat SAF that needs to be blended in accordance with SAF blending limitations under ASTM.

1.4 Furthermore, according to the LTAG report, LCAF demonstrate CO₂ abatement costs comparable to those of SAF, with added benefits of lower work with fuel standards bodies and Sustainability Certification Schemes (SCS) and can therefore be considered to have better readiness and scalability at commercial scale in the short term (from the present year through 2035).

2. ANALYSIS

2.1 LCAF is defined in Annex 16 Vol IV as a “A fossil-based aviation fuel that meets the CORSIA Sustainability Criteria under this Volume.” Economic operators are required to determine if the Life Cycle Emissions Factor (LCEF) of the LCAF is *at least 10 per cent lower* than the baseline (i.e., < 80.1 gCO₂e/MJ, based on an 89 gCO₂e/MJ baseline). Nevertheless, the LCAF shall be certified and therefore, air operators must engage a **Corsia-approved SCS** to validate the LCEF calculations and ensure compliance with all relevant CORSIA requirements.

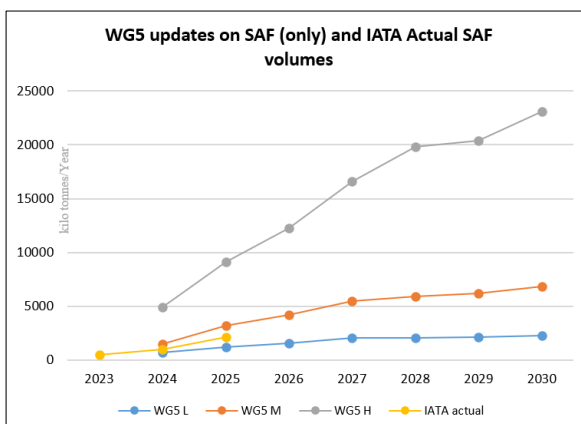
2.2 To achieve the GHG emissions reduction to meet the CORSIA requirements, LCAF producers can reduce GHG emissions from conventional petroleum fuel production and supply chain. The direct GHG emissions reductions could be achieved through measures such as carbon capture and sequestration (CCS), renewable and low carbon intensity hydrogen, and renewable and low carbon intensity electricity or additional mitigation measures, such as methane emission management (venting, flaring and fugitives - VFF) and use of newly developed crudes can also be part of LCAF technologies.

Table 1
Life Cycle Assessment (LCA) system boundary for LCAF production
and key LCAF GHG mitigation measures

LCA system boundary for LCAF production		LCAF GHG mitigation measures	Emission value	LCAF scope
Crude oil extraction	• Drilling and development • Production and extraction • Surface processing	Renewable integrated oil extraction No flaring No or minimum venting	9.6 gCO _{2e} /MJ	YES
Crude oil processing				
Crude transport				
Refining	• Atmospheric distillation and vacuum distillation • Straight run • Hydrotreatment • Hydro conversion	Carbon capture Low-carbon CO ₂ Low-carbon utilities	5.3 gCO _{2e} /MJ	YES
Fuel distribution				
Fuel combustion	-	-	74 gCO _{2e} /MJ	NO

2.3 In order to start and scale up the production capacity for LCAF under LTAG-IS1 scenario, it is estimated that the fuels suppliers would need to invest \$50 billion through 2050 for LCAF to reach to an estimated 7% aviation energy use (in 2050). Whereas a comparison of the current CEFs trends worldwide indicates there is no LCAF production. In line with the latest reports by IATA and CAEP Working Group 5 (WG5), it is possible to highlight that continued inaction on LCAF by the economic operators will result in repeating a similar scenario (very low availability) of SAF.

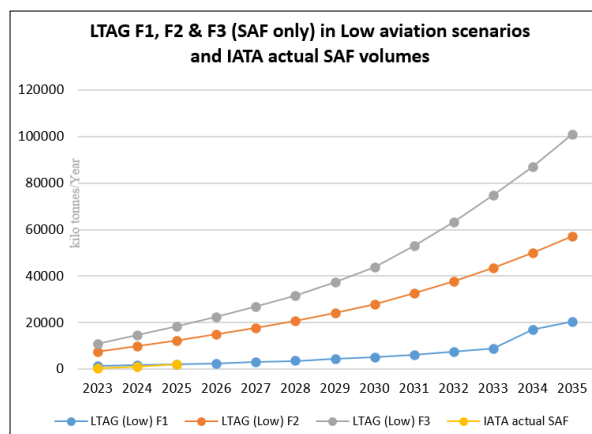
Figure 1



Source:

1. SAF short-term projections ([link](#))
2. SAF Production an article by IATA dated 10 December 2024) ([link](#))

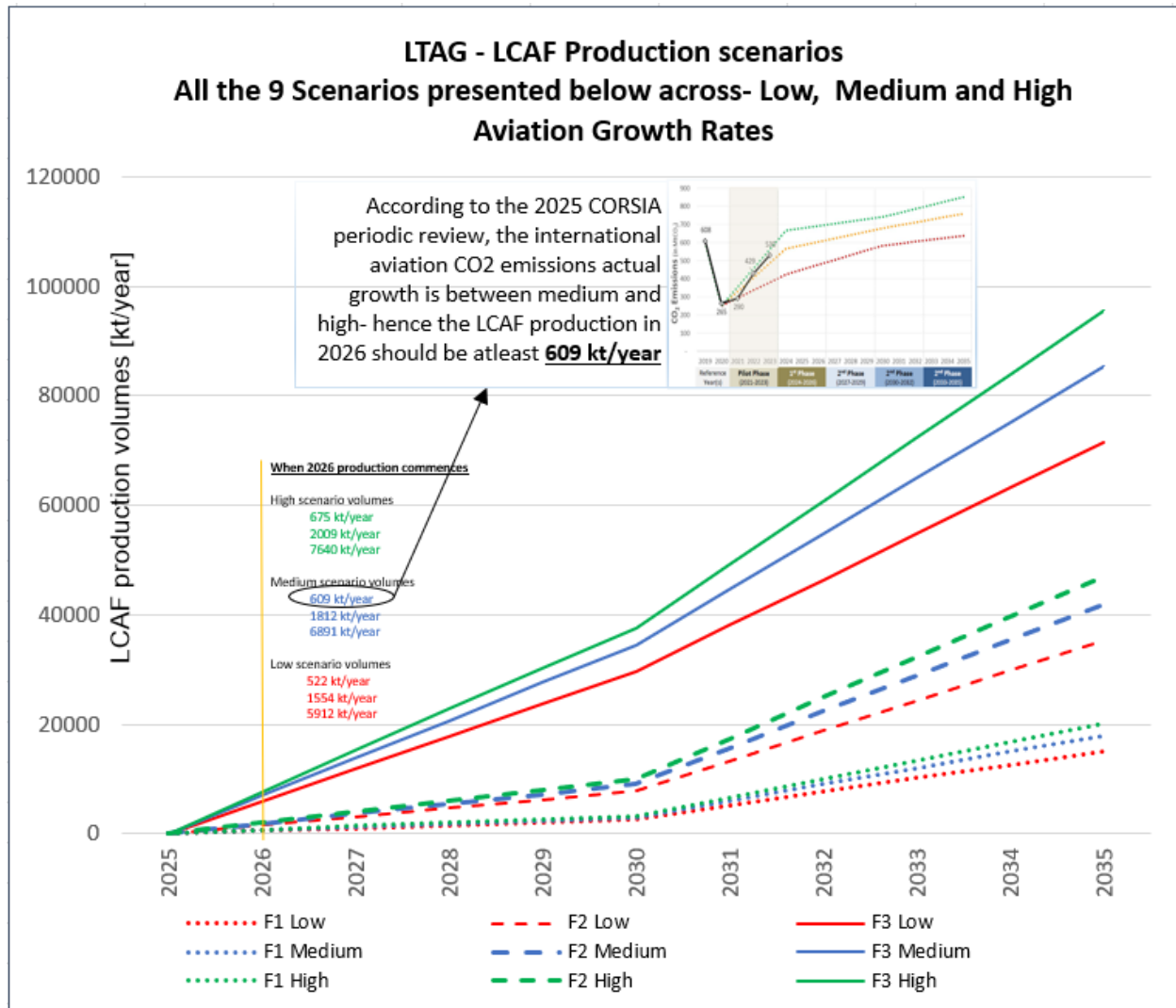
Figure 2



Source:

1. LTAG Report Data for States ([link](#))
2. SAF Production an article by IATA dated 10 December 2024) ([link](#))

Figure 3



Source:

1. LTAG Report Data for States
2. CAEP Assessment 2025 CORSIA periodic review Report

2.4 As illustrated in Figure 3 above, realizing the active potential of LCAF —beginning in 2026 with the successful deployment of 609 kilotonnes per year—would result in an estimated reduction of approximately 190 kilotonnes of CO₂ emissions from international aviation.

2.5 The certification of LCAF as CORSIA eligible fuels is not yet covered under of the existing SCS of CORSIA. Consequently, the SCS procedures currently exclude LCAF certification related requests from oil producers and or economic operators. Once approval for LCAF certification is granted by ICAO, all the requirements for LCAF certification will officially be integrated into the SCS CORSIA system documents.

2.6 To accelerate efforts by ICAO in this direction, a review of the SAF volumes produced currently can provide important policy inputs for LCAF developments by oil companies. Insights into current SAF markets indicate that SAF accounted for only 0.3% of global jet fuel production in 2024 and is barely

expected to reach 0.7% of total jet fuel production in 2025. The corresponding scaleup targets for SAF as per the LTAG are 27% and 100%, for IS1 and IS3 respectively. This trend has been reflected in the above figures 1 and 2 as a yellow line, where it is clearly indicated that we are just above the IS1 and well below IS2, for SAF. A similar trend for LCAF can very well be avoided, if acted upon timely by increasing efforts for LCAF deployment, going forward as analysed in this working paper.

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