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**SUPPLEMENTARY INFO ON THE ROLE OF SUSTAINABILITY CERTIFICATION
SCHEMES IN ENABLING LOWER CARBON AVIATION FUELS AS A LOW HANGING
FRUIT IN AVIATION DECARBONISATION**

(Presented by Saudi Arabia, Egypt, Nigeria and The United Arab Emirates)

EXECUTIVE SUMMARY	
This Information Paper provides supplementary information to the Assembly Working Paper titled “The Role of Sustainability Certification Schemes in Enabling Lower Carbon Aviation Fuels as a Low-Hanging Fruit in Aviation Decarbonization”, presented by Saudi Arabia, Egypt, Nigeria, and the United Arab Emirates to the Executive Committee as A42-WP/126. The supplementary information on Lower Carbon Aviation Fuels (LCAF) includes its definition, indicative emissions reduction costs compared to conventional jet fuel, Long-Term Aspirational Goal-Lower Carbon Aviation Fuels (LTAG-LCAF) projections, and the list of Sustainability Certification Schemes currently approved under Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).	
<i>Strategic Goals:</i>	This working paper relates to the Strategic Goal – <i>Aviation is Environmentally Sustainable</i> .
<i>Financial implications:</i>	
<i>References:</i>	

1. LOWER CARBON AVIATION FUEL (LCAF): DEFINITION

1.1 International Civil Aviation Organization (ICAO) recognized Lower Carbon Aviation Fuel (LCAF) as a measure, alongside Sustainable Aviation Fuels (SAF), that helps reduce aviation's greenhouse gas (GHG) lifecycle emissions. The implementation of LCAF as CORSIA Eligible Fuel (CEF) acknowledges the variability of petroleum-based aviation fuels and provides recognition to producers who adopt improved practices that achieve lower carbon intensity.

1.2 CORSIA framework establishes that conventional aviation fuel from petroleum could be eligible to be certified as LCAF, if it meets the CORSIA Sustainability Criteria, including a 10% reduction in lifecycle emissions compared to the aviation fuel baseline of 89 gCO₂e/MJ.

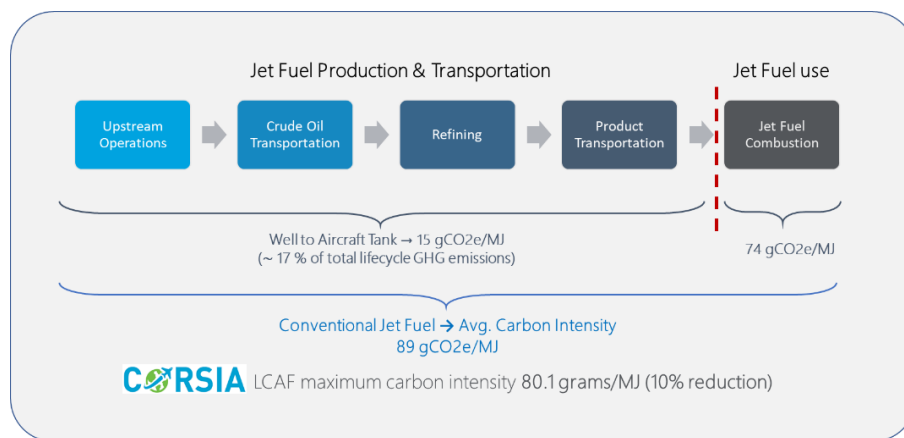


Figure A – Supply Chain of conventional aviation fuel from petroleum

1.3 The baseline of value is the outcome of the weighted average of producers with varying lifecycle emissions. With some producers below and some above the average (data source from [The Archie Initiative](#)).

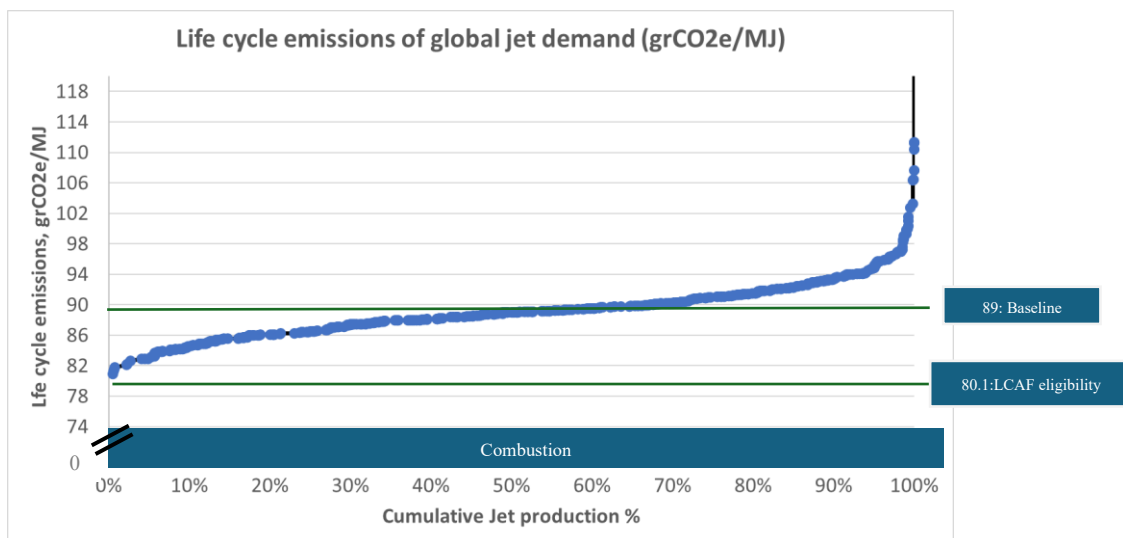


Figure B – Life Cycle Emissions variation of global jet A-1 production

1.4 It is worth noting that, given the default value of 74 gCO₂e/MJ for LCAF combustion, achieving the required 10% reduction in lifecycle emissions (well-to-wake), translates to a (significant) 60% reduction on a well-to-aircraft-tank emissions part.

1.5 There are different pathways/alternatives for reducing GHG emissions across conventional aviation fuel from petroleum, including but not limited to:

- Measures for eliminating and/or reducing of venting, flaring and fugitive emissions
- Use of lower carbon electricity
- Energy efficiency measures to reduce energy demand
- Carbon Capture and Storage
- Use of lower carbon hydrogen

2. JET TO LCAF INDICATE EMISSIONS REDUCTION COSTS

2.1 An estimation of the total GHG emissions of Jet A-1's production was developed, on the basis of the data in the previous section (<https://archieinitiative.org/>). From these, the GHG emissions reductions achieved by transforming Jet A-1 to LCAF compliant was estimated. Breaking down these emissions reductions and their corresponding costs to those related with Upstream (well to refinery gate) and Downstream (refinery gate to airport) operating activities. With this:

- A. The resultant GHG emissions reduction for producing LCAF in each supply chain was estimated.
- B. The resultant emissions reductions costs (in \$/tCO₂e reduced) were established. Using average industry reduction costs per operational sector: With Upstream and Downstream costs at 65 and 135 \$/tCO₂e respectively.

2.2 Subsequently, for each specific supply chain, an equivalent cost of abatement for Low Carbon Aviation Fuel (LCAF) was estimated (Equation 1). This estimate was derived from the ratio of the cost of emissions reduction in each specific supply chain to the potential emissions reduction achievable with LCAF.

$$LCAF_{abatement\ cost} = \frac{Cost_{Emissions\ reduction}}{LCAF_{Emissions\ reduction}} \quad (\text{Equation 1})$$

Where:

$LCAF_{abatement\ cost}$	<i>The equivalent cost of GHG emissions reduction of LCAF</i>
$Cost_{Emissions\ reduction}$	<i>The cost of reducing GHG emissions in the specific supply chain</i>
$LCAF_{Emissions\ reduction}$	<i>The emissions reduction achieved through LCAF, which is specific for each supply chain and is a function of the differential of well-to-wake GHG emissions intensity, between initial emissions and reaching the LCAF eligibility threshold (80.1 grCO₂e/MJ)</i>

2.3 Figure C presents the aggregated results of the equivalent emissions reduction cost of LCAF across the total volume of Jet A-1 production. Notably, more than 95% of the total production falls within a competitive emissions reduction cost of 75 –150 \$/ tCO₂e, with a weighted average abatement cost of ~100 \$/tCO₂e.

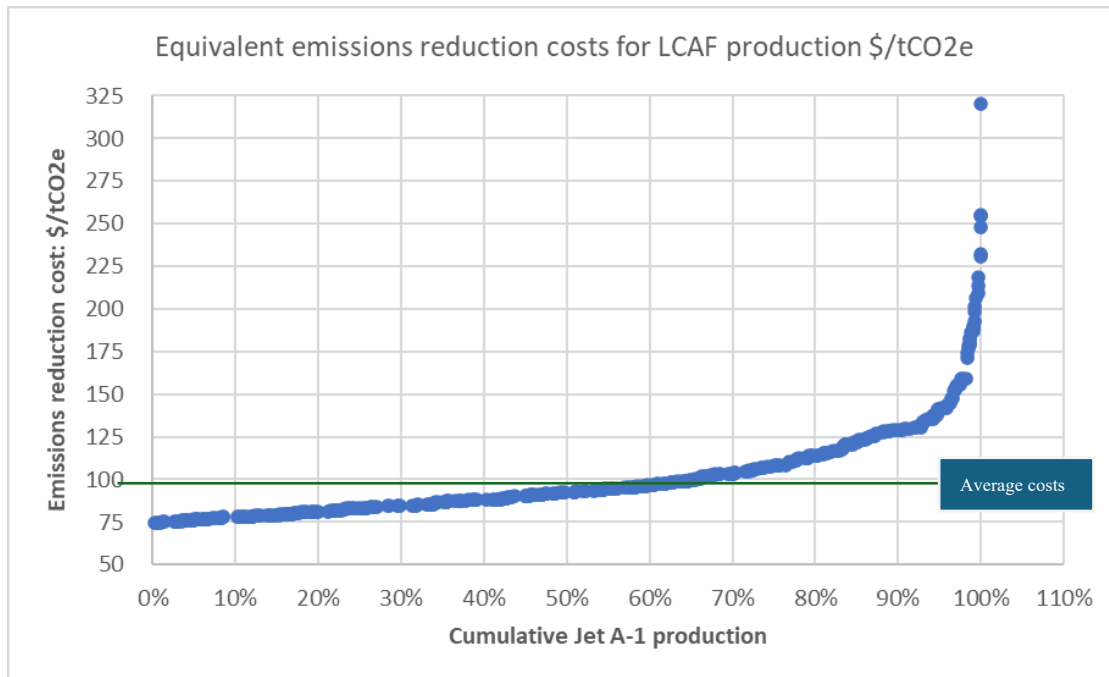


Figure C – Equivalent Emissions Cost of LCAF

3. LTAG-LCAF PROJECTIONS

3.1 Recognition of LCAF's potential for Aviation's GHG emissions reduction is well established in LTAG-TG "Report on Feasibility of Long-Term Aspirational Goal (LTAG) for International Civil Aviation CO₂ Emissions Reduction", (March 2022). Considering a Mid Traffic Scenario and the middle range of potential GHG reductions from fuels (Scenario F2, Appendix M5), LCAF will represent ~ 10% (7.3) and ~30% (28.1) of international aviation's total fuel pool. Resulting in a GHG emissions reductions of approximately 16 MtCO₂e/year by 2035 and 39 MtCO₂e/year by 2050. See figure D below.

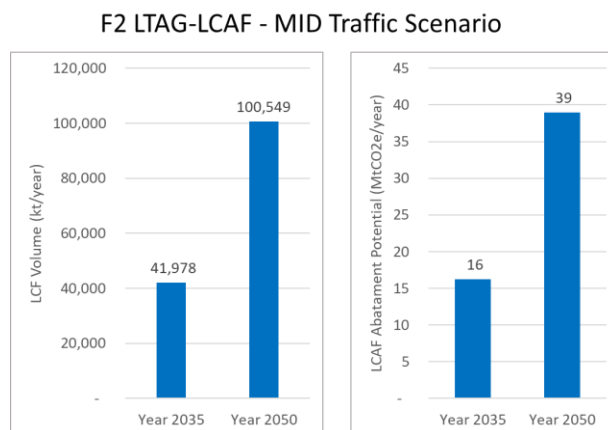


Figure D – LCAF Projections (LTAG)

4. LCAF CERTIFIED ECONOMIC OPERATOR

4.1 To be certified as a LCAF producer, an economic operator must undergo a certification process, which consist of an audit, executed by a Certification Body (CB), against the requirements set by an approved Sustainability Certification Scheme (SCS), to certify compliance with the ICAO's LCAF framework.

Table A. ICAO LCAF related documents

Document	Edition	LCAF related content
CORSIA Sustainability Criteria for CORSIA Eligible Fuels	3 rd Edition – Nov 2022	Sustainability Criteria applicable to batches of CORSIA LCAF produced by certified fuel producers on or after January 1, 2024
CORSIA Methodology for Calculating Actual Life Cycle Emissions Values	5 th Edition – October 2024	Methodologies for determining emissions reductions from the use of CORSIA LCAF and assessing eligibility against Sustainability Criterion 1.1, as outlined in the ICAO document "CORSIA Sustainability Criteria for CORSIA Eligible Fuels".

5. APPROVED SUSTAINABILITY CERTIFICATION SCHEMES UNDER CORSIA

5.1 ICAO document “**CORSIA Approved Sustainability Certification Schemes**” lists three approved Sustainability Certification Schemes, listed in table B. All the three approved SCS, are approved to certify an economic operator as SAF producer. None is yet approved for certifying an economic operator as LCAF producer.

Table B. CORSIA Approved Sustainability Certification Schemes

Name of the Sustainability Certification Scheme	Date of approval	Scope of approval
International Sustainability and Carbon Certification (ISCC)	16 Jun. 2023	Certification of CORSIA Sustainable Aviation Fuels economic operators covered by Chapters 1 and 2 of the ICAO document “CORSIA Sustainability Criteria for CORSIA eligible fuels”
Roundtable on Sustainable Biomaterials (RSB)	16 Jun. 2023	Certification of CORSIA Sustainable Aviation Fuels economic operators covered by Chapters 1 and 2 of the ICAO document “CORSIA Sustainability Criteria for CORSIA eligible fuels”
ClassNK	28 Oct. 2024	Certification of CORSIA Sustainable Aviation Fuels economic operators covered by Chapters 1 and 2 of the ICAO document “CORSIA Sustainability Criteria for CORSIA eligible fuels”