



ICAO



PRE-EVENT
OUTCOMES CONSULTATION

25 - 26 SEPTEMBER 2023 | ICAO HQ





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SESSION 1 - SETTING THE SCENE

TECHNICAL INPUTS FROM THE ICAO COMMITTEE ON AVIATION ENVIRONMENTAL PROTECTION (CAEP)

Presented by CAEP



CAEP Technical Inputs

Part I

Possible metrics for potential quantified goals and projections on the global levels of cleaner energy use by international aviation



The ICAO Council requested CAEP to :

- Identify possible metrics for potential quantified goals for cleaner energy for international aviation (e.g. percentages (%) or absolute values (mass/volume), in terms of the uptake levels of SAF, LCAF and other cleaner energies for aviation, or in terms of CO2 emissions reduction levels), highlighting any advantages and disadvantages for each possible metric; and,
- Using the possible metrics identified above, together with the CAEP LTAG Report, provide projections on the global levels of cleaner energy use for international aviation, across intermediate milestones, such as 2030, 2040, through to 2050.

**Relevant part of draft ICAO Global Framework:
Building Block 1 - Policy and Planning (ICAO Vision)**

Possible metrics identified

	Metric option	Unit		Metric option	Unit
1	Mass of cleaner energy	KiloTonne (kt)	6	% CO ₂ e emissions reduction from the use of cleaner energy	%
2	Mass of cleaner energy (<i>Metric 1</i>) per total mass of fuel	%	7	Mass average carbon intensity (CI) of fuel	gCO ₂ e/MJ
3	Total CO ₂ e emitted per year	Milliontonne (Mt)	8	Cumulative total CO ₂ emissions over the period between 2020 and 2050	GigaTonne (Gt)
4	Total CO ₂ e emitted per year (<i>Metric 3</i>) per total mass of fuel	Tonne CO ₂ e / Tonne of fuel	9	gCO ₂ /RTK	gram CO ₂ / Revenue Tonne Kilometer
5	CO ₂ e emissions reductions from use of cleaner energy	Million tonne (Mt)	10	gCO ₂ /ATK	gram CO ₂ / Available Tonne Kilometer



Criteria for assessment of possible metrics

A set of criteria was applied to assess the advantages of each possible metric:

- **Metric is reported by aeroplane operators as part of CORSIA requirements;**
- **Metric is made available by ICAO in the CORSIA Central Registry, or can be calculated/tracked with the use of available CCR information;**
- **Allows to track progress toward the LTAG, e.g. can be used to assess short, mid, and long-term intermediate goals;**
- **Provides a benchmark for comparison; e.g. the metric compares against a reference value instead of being an absolute number.**

Meeting all of the criteria is not a prerequisite for the suitability of a possible metric. Some criteria may be relevant to certain metrics only. A combination of metrics may also be considered.

Assessment of possible metrics with criteria (1 of 2)

	Metric option	Metric is reported by aeroplane operators as part of CORSIA requirements	Metric is made available by ICAO in the CORSIA Central Registry, or can be calculated/ tracked with the use of available CCR information (*)	Metric Allows tracking progress toward the LTAG, e.g. can be used to assess short, mid, and long-term intermediate goals	Provides a benchmark for comparison; e.g. the metric compares against a reference value instead of being an absolute number	Disadvantages
1	Mass of cleaner energy	✓	✓			Does not capture environmental benefits of cleaner energy or non drop in fuels. Affected by factors beyond cleaner energy (e.g. Tech, Ops, Demand).
2	Mass of cleaner energy (<i>Metric 1</i>) per Total mass of fuel		✓		✓	Does not capture environmental benefits of cleaner energy or non drop in fuels.
3	Total CO _{2e} emitted per year	✓	✓	✓		Affected by factors beyond cleaner energy (e.g. Tech, Ops, Demand).
4	Total CO _{2e} emitted per year (<i>Metric 3</i>) per total mass of fuel		✓	✓		
5	CO _{2e} reduction from use of cleaner energy	✓	✓	✓		Affected by factors beyond cleaner energy (e.g. Tech, Ops, Demand).

(*) CCR covers CO₂ emissions from international aviation up to 2035



Assessment of possible metrics with criteria (2 of 2)

	Metric option	Metric is reported by aeroplane operators as part of CORSIA requirements	Metric is made available by ICAO in the CORSIA Central Registry, or can be calculated/ tracked with the use of available CCR information (*)	Metric Allows tracking progress toward the LTAG, e.g. can be used to assess short, mid, and long-term intermediate goals	Provides a benchmark for comparison; e.g. the metric compares against a reference value instead of being an absolute number	Disadvantages
6	% CO _{2e} emissions reductions from the use of cleaner energy		✓	✓	✓	
7	Mass average carbon intensity (CI) of fuel (gCO _{2e} /MJ)		✓	✓	✓	
8	Cumulative CO ₂ emissions between 2020 and 2050		✓	✓		Affected by factors beyond cleaner energy (e.g. Tech, Ops, Demand).
9	gCO ₂ /RTK			✓	✓	Affected by factors beyond cleaner energy (e.g. Tech, Ops, Demand). Restricted to commercial aviation.
10	gCO ₂ /ATK			✓	✓	Affected by factors beyond cleaner energy (e.g. Tech, Ops, Demand).

Summary - Disadvantages of possible metrics

Not reflecting ENV benefits of cleaner energies	Metrics 1 and 2
Lack of available data, such as through CORSIA Central Registry, to track progress	Metrics 9 and 10
Affected by other measures beyond cleaner energies (technology / operation)	Metrics 3, 5 and 8
Is an absolute number and do not compare against a reference value	Metric 1, 3, 4, 5, 8

Metrics 6 and 7 aren't affected by these disadvantages



Metric 6 – % CO₂ reduction from the use of Cleaner energy

- This metric can be obtained with the use of information already being reported under CORSIA and published on the CORSIA website.

$$\begin{array}{l} \text{Metric 6} \\ \% \text{ CO}_2 \text{ reduction} \\ \text{from the use of} \\ \text{Cleaner energy} \end{array} = \left(\frac{\text{CO}_2 \text{ reductions from} \\ \text{CORSIA SAF and LCAF}^{**}}{\text{Total CO}_2 \text{ emissions from} \\ \text{international aviation}^*} \right) \times 100\%$$

* Can be obtained summing up the emissions reported for aeroplane operators, as per requirements of Annex 16, Vol IV, Table A5-5. **This information is available at <https://www.icao.int/environmental-protection/CORSIA/Pages/CCR.aspx> ;**

**CEF claims information will also be available on the website above, as per requirements of Annex 16, Vol IV, Table A5-6. It should be noted that not all CEF will necessarily be claimed under CORSIA; operators are expected to only report emission reductions claims from CEF if they are subject to offsetting requirements.



Metric 7 – mass average carbon intensity (CI) of fuel

- This metric can be easily obtained with the use of information already being reported under CORSIA and published on the CCR.

Metric 7
Mass average
carbon intensity
of fuel
(gCO₂e/MJ)

=

89

×

1 -

CO₂ reductions from
CORSIA SAF and LCAF **

Total CO₂ emissions from
international aviation*

CORSIA Baseline life cycle
emissions for aviation fuel –
Defined in Annex 16 Vol IV, 3.3.1

This is Metric 6
% CO₂ reduction from the
use of Cleaner energy



Projections on global levels of cleaner energy use for international aviation

- Using the 8 first metrics identified, CAEP assessed the projections on the global levels of cleaner energy use for international aviation, based on the LTAG Report.

Unit to read the **8 metrics** projections **LTAG Fuels Scenarios for 2030, 2040 and 2050**

Metric Option	Unit	Scenario F1			Scenario F2			Scenario F3		
		2030	2040	2050	2030	2040	2050	2030	2040	2050
1 Mass of Cleaner energy	kt	8292	51732	129354	36971	188802	357319	78493	275912	335619
2 Mass of cleaner energy/Total mass of fuel	%	3.81	17.73	34.45	17.13	65.94	100.00	36.97	100.00	100.00
3 Total CO _{2e} emitted	Mt	816.61	1024.25	1155.97	742.62	756.18	599.62	672.94	465.14	242.65
4 Total CO _{2e} emitted per year/Total mass of fuel	t CO ₂ /t of fuel	3.75	3.51	3.08	3.44	2.64	1.68	3.17	1.69	0.72
5 CO _{2e} reduction from the use of cleaner energy	Mt	15.95	92.68	280.91	83.24	339.66	767.84	139.53	590.77	1041.77
6 % CO _{2e} emissions reduction from the use of cleaner energy	%	1.92	8.30	19.55	10.08	31.00	56.15	17.17	55.95	81.11
7 Mass average carbon intensity (CI) of fuel (gCO _{2e} /MJ) ^b	gCO _{2e} /MJ	87.30	81.62	71.60	80.03	61.41	39.03	73.72	39.21	16.81
8 Cumulative CO ₂ emissions over the period between 2020 and 2050	GtCO ₂	23			17			12		

Projections on global levels of cleaner energy use for international aviation, using the possible metrics identified

For details on the LTAG fuels analysis, including its scenarios and associated costs <https://www.icao.int/environmental-protection/LTAG/Pages/LTAG-and-Fuels.aspx>



CAEP Technical Inputs

Part II

Possible parameters for fuel accounting and reporting methodologies for international aviation, to ensure consistent application as part of monitoring the LTAG progress.





ICAO Council requested CAEP to identify possible parameters for fuel accounting and reporting methodologies for international aviation, to ensure consistent application as part of monitoring the LTAG progress.

Relevant part of draft ICAO Global Framework: Building Block 2 - Regulatory framework



General - Possible parameters for fuel accounting and reporting methodologies for international aviation

- CO₂ emissions from international aviation is a **direct result of the production and combustion of aviation fuels**.
- The **reliable accounting** of the amount of aviation fuels used, their associated CO₂ emissions and any CO₂ emissions reductions in their production is a critical component in the efforts of ICAO States **to monitor the progress made towards achieving the LTAG** of net-zero CO₂ emissions by 2050.
- From a technical perspective, in the context of greenhouse gas (GHG) emissions methodologies, **there should be specific principles that apply to the estimation/measurement and reporting of GHGs**, such as transparency, accuracy, consistency, comparability and completeness (*see next slide*).

Technical principles applying to estimation/measurement and reporting of GHGs

- **Transparency:** Assumptions and methodologies used for the estimation of emissions and emissions reductions should be **clearly reported and explained**;
- **Accuracy:** Estimates should be systematically **neither over nor under true emissions**, so far as can be judged, and uncertainties should be reduced so far as is practicable;
- **Consistency:** Estimates should be **internally consistent over a period of years** (for example, using the same estimation methodologies over time);
- **Comparability:** Reported estimates should be **comparable among countries** by using agreed estimation methodologies and reporting formats; and
- **Completeness:** Estimates should **cover all international routes** from all civil aircraft.



Possible parameters for fuel accounting and reporting methodologies for international civil aviation (1 of 2)

- a) They should be ensuring global coverage of emissions from international civil aviation, as part of monitoring of the LTAG progress;
- b) They should be supporting consistent application of methodologies amongst States, in a transparent manner;
- c) They should be enabling accurate emissions reporting, including the use of cleaner energy for international civil aviation;
- d) They should be ensuring environmental integrity through the avoidance of double-counting, including between domestic and international civil aviation;

Possible parameters for fuel accounting and reporting methodologies for international civil aviation (2 of 2)

- e) They should be preferring **verified emissions information** that could be supported with other information for the verification or validation of reported emissions
- f) They should be promoting **cost-effectiveness** by using simple accounting and reporting methodologies and procedures
- g) They should be **avoiding excessive administrative burden** on States and aeroplane operators
- h) They should be leveraging (to the extent possible) **existing methodologies and procedures under the CORSIA Monitoring, Reporting and Verification (MRV) system** for international civil aviation

Reference - Overview of CORSIA MRV system

The CORSIA implementation relies on the **monitoring, reporting and verification (MRV) of data on annual CO₂ emissions** for all years of the scheme's duration (2019-2035), based on the collection and processing of such data as defined by Annex 16, Volume IV.

- Aeroplane operators covered by CORSIA are required to **monitor and report their verified CO₂ emissions annually to States**, and then to ICAO.
- An aeroplane operator can **claim the reduction of its CORSIA CO₂ offsetting requirements** through the use of **CORSIA eligible fuels (CEF)**: sustainable aviation fuels (SAF); and lower carbon aviation fuels (LCAF).
- Such claiming of CO₂ reduction benefits from the use of CEF needs to follow: **CORSIA sustainability criteria; life-cycle emission values, and sustainability certification, based on a harmonized ICAO regulatory framework.**

Additional considerations for fuel accounting and reporting methodologies for international civil aviation

In the context of the LTAG monitoring, CAEP considers that fuel accounting and reporting methodologies for international civil aviation are not expected to have negative effects (e.g. increased costs or administrative burden) to the sustainable development of international civil aviation.

Since the LTAG is a collective goal from ICAO and its Member States, any emission reductions captured by fuel accounting and reporting methodologies will be accounted equally for in achieving the LTAG, independently from where the cleaner energy is produced and/or accounted for.

CAEP consideration of these possible parameters for fuel accounting and reporting methodologies is in the context of monitoring of the LTAG progress. It is separate, and distinct from the current industry-led SAF book and claim systems, with its own methodologies.



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