

The "Sustainability" in SAF Efforts Being Taken Today and an Update on CORSIA

To: CAAFI SAF Mini-Symposium
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Federal Aviation
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Sustainability is Already in SAF

- Various global voluntary certification schemes already offer sustainability certification for their members.
- Schemes like Roundtable on Sustainable Biomaterials (RSB) and International Sustainability & Carbon Certification (ISCC) have the ability to certify to sustainability principals.
- Many of the key players in the current SAF supply chain (e.g., BP, ECB, Gevo, LanzaTech, Nuseed, Neste, Phillips 66, REG, Saipol, Shell, SkyNRG Total, UPM, Velocys, WorldEnergy) are members of RSB or ISCC and are certified under these schemes.
- Sustainability has also entered into the investment community with ESG (Environmental, Social, and Corporate Governance) being a phrase used in measuring the sustainability and societal impact of a company or business.
- CORSIA includes Sustainability principals that align with the current business acumen around SAF – it is leveraging established practices



Rationale for Considering Sustainability

- Sustainability can be considered on a voluntary basis or be compulsory
- Many regulations (e.g., EPA RFS, California LCFS, EU RED) have compulsory sustainability criteria, most of which apply to the fuel producer – these are in addition to lifecycle CO2 reduction requirements (e.g., 50% reduction for Advanced Biofuel and 60% for Cellulosic Biofuel under EPA RFS)
- Based on the comprehensive nature of the evaluations done in CORSIA, some in the industry are seeking to use CORSIA principles for addressing sustainability in other policy mechanisms
- CORSIA does provide an example for how other mechanisms could be thinking about sustainability more broadly, but many mechanisms already consider sustainability in some way

SUSTAINABILITY THEMES CONSIDERED IN CORSIA:
1. Greenhouse Gases (GHG)
2. Carbon stock
3. Water
4. Soil
5. Air
6. Conservation
7. Waste and Chemicals
8. Human and labour rights
9. Land use rights and land use
10. Water use rights
11. Local and social development
12. Food security



Existing Approaches to Sustainability

There are many existing approaches to sustainability that are in use today.

CAEP-Proposed Themes	EXISTING APPROACHES TO SUSTAINABILITY									
	UN FAO SAFA	GBEP	ISO	EU RED	ISPO	RFS2	Bonsucro	ISCC	RSB	RSPO
3. Water	X	X	X	X	X	X	X	X	X	X
4. Soil	X	X	X	X	X	X	X	X	X	X
5. Air	X	X	X	X	X	X	X	X	X	X
6. Conservation	X	X	X	X	X	X	X	X	X	X
7. Waste and Chemicals	X	X	X	X	X	X	X	X	X	X
8. Human and labour rights	X	X	X	X	X		X	X	X	X
9. Land use rights and land use	X	X	X	X	X		X	X	X	X
10. Water use rights	X		X				X	X	X	X
11. Local and social development	X	X		X	X	X	X	X	X	X
12. Food security	X	X	X	X		X		X	X	
Total of Themes Covered	10	9	9	9	8	7	9	10	10	9

Internationally-agreed approaches	Regulatory approaches	Voluntary certification schemes
<ul style="list-style-type: none"> UN FAO SAFA (Sustainability Assessment of Food and Agriculture Systems) GBEP (Global Bioenergy Partnership) ISO 13065 - Sustainability criteria for bioenergy 	<ul style="list-style-type: none"> EU Renewable Energy Directive (RED) Indonesian Sustainable Palm Oil United States Renewable Fuel Standard (RFS) 	<ul style="list-style-type: none"> Bonsucro ISCC (International Sustainability and Carbon Certification) RSB (Roundtable on Sustainable Biomaterials) RSPO (Roundtable on Sustainable Palm Oil)



U.N. International Civil Aviation Organization (ICAO)

- ICAO sets standards and recommended practices for civil aircraft to enable our global aviation system
- General Assembly of 193 ICAO Member States
 - Meets every three years (this cycle sets the pace of ICAO work)
 - Assembly approves/endorsees work conducted in the previous three years and sets forth commitments and future work by ICAO
 - Resolution – method by which the Assembly makes policy and commitments
- ICAO Council
 - 36 member states with permanent representatives
 - ICAO Council conducts day-to-day oversight of ICAO work program; meets for two week voting sessions four times per year
- ICAO five Strategic Objectives:
 1. Safety
 2. Air Navigation Capacity and Efficiency
 3. Security & Facilitation
 4. Economic Development of Air Transport
 5. Environmental Protection
- ICAO Committee on Aviation Environmental Protection (CAEP)
 - Standing Committee of the Council to conduct environmental technical work



ICAO Efforts to Address Climate Change

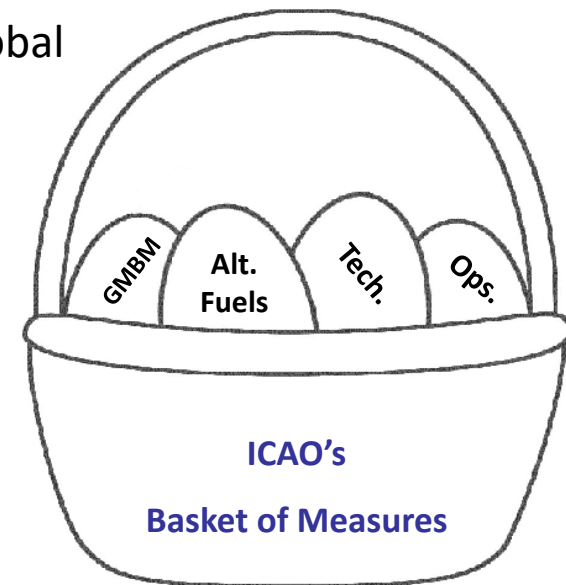
Direction from the 40th ICAO General Assembly

Assembly Resolution A40-18

- 2% annual fuel efficiency improvement until 2020, and aspirational 2% from 2021-2050. (para 4)
- CNG 2020 medium-term goal – “a collective medium-term global aspirational goal of keeping the global net carbon emissions from international aviation from 2020 at the same level...” (para 6)
- Long-term goal – “explore the feasibility of a long term global aspiration goal...the progress of the work to be presented to 41st Assembly.” (para 9)

Assembly Resolution A40-19

- “*Determines* that the CORSIA is the only global market-based measure applying to CO2 emissions from international aviation...” (para 18)



ICAO “Carbon Offsetting & Reduction Scheme for International Aviation” (CORSIA)



- CORSIA is a Global Carbon Offsetting Scheme
 - Offsetting to help international aviation meet Carbon Neutral Growth goal (relative to 2020 baseline)
 - Not a carbon tax or emissions trading scheme
 - Applies to Aircraft Operators, International Operations Only
 - Offsets required from 2021-2035
 - Have an initial pilot phase from 2021-2023
 - Council will conduct a review of CORSIA in 2022, ahead of 41st Assembly
- CORSIA Eligible Fuels (CEF) can be used by an airline to reduce their offsetting requirements

Offsetting, Fuels, and CORSIA

Two means for an aeroplane operator to comply with CORSIA

1. Offsetting with Emissions Units
2. Claiming Emissions Reductions from CORSIA Eligible Fuels

Two types of CORSIA Eligible Fuels (CEF)

“CORSIA Sustainable Aviation Fuel”: renewable or waste-derived fuel

“CORSIA Lower Carbon Aviation Fuel”: fossil-based fuel

$$Emissions\ Reduction = 3.16 * \left[\sum Neat\ Fuel\ Mass * \left(1 - \frac{Life\ Cycle\ Emissions}{89\ g\ CO_2/MJ} \right) \right]$$

To be eligible for CORSIA, a fuel needs to meet the CORSIA Sustainability Criteria as certified by ICAO Council Approved Sustainability Certification Scheme (SCS)



CORSIA Eligible Fuels – Key Documents

There are a number of ICAO documents that contain information related to CORSIA Implementation

Annex 16 Volume IV

See: <https://www.icao.int/environmental-protection/CORSIA/Pages/SARPs-Annex-16-Volume-IV.aspx>

CORSIA Implementation Elements

See: <https://www.icao.int/environmental-protection/CORSIA/Pages/implementation-elements.aspx>

Five ICAO documents relate to CORSIA Eligible Fuels

See: <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx>

ICAO / Environmental Protection / CORSIA / CORSIA Eligible Fuels

ENV Homepage
CORSIA Homepage
CORSIA IMPLEMENTATION ▶
ACT CORSIA ▶

CORSIA Eligible Fuels

This ICAO CORSIA Implementation Element is reflected in five ICAO documents referenced in Annex 16, Volume IV. They are available for download below.

CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes	CORSIA Approved Sustainability Certification Schemes*	CORSIA Sustainability Criteria for CORSIA Eligible Fuels	CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels**	CORSIA Methodology for Calculating Actual Life Cycle Emissions Values

*Sustainability Certification Schemes interested in being evaluated should follow the application process described here.

**The CORSIA Supporting Document "CORSIA Eligible Fuels - Life Cycle Assessment Methodology" provides technical information and describes ICAO processes to manage and maintain the ICAO document "CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels", including the process to add new default values to this ICAO document.

Relationship among the CORSIA Eligible Fuel Documents and Annex 16 Volume IV

Annex 16 Vol. IV References

2.2.4.1 The **aeroplane operator** that intends to claim for emissions reductions from the use of CORSIA eligible fuels shall use a CORSIA eligible fuel that meets the CORSIA Sustainability Criteria as defined within **the ICAO document entitled “CORSIA Sustainability Criteria for CORSIA Eligible Fuels”** that is available on the ICAO CORSIA website.

2.2.4.2 The **aeroplane operator** that intends to claim for emissions reductions from the use of CORSIA eligible fuels shall only use CORSIA eligible fuels from fuel producers that are certified by an **approved Sustainability Certification Scheme** included in **the ICAO document entitled “CORSIA Approved Sustainability Certification Schemes”**, that is available on the ICAO CORSIA website. Such certification schemes meet the requirements included in **the ICAO document entitled “CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes”**, that is available on the ICAO CORSIA website.

3.3.1 The **aeroplane operator** that intends to claim for emissions reductions from the use of CORSIA eligible fuels in a given year shall compute emissions reductions as follows:

$$ER_y = FCF * \left[\sum_f MS_{f,y} * \left(1 - \frac{LS_f}{LC} \right) \right]$$

3.3.2 If a Default Life Cycle Emissions value is used, then the **aeroplane operator** shall use **the ICAO document entitled “CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels”** that is available on the ICAO CORSIA website for the calculation in 3.3.1.

3.3.3 If an Actual Life Cycle Emissions value is used, then an **approved Sustainability Certification Scheme** shall ensure that the methodology, as defined in **the ICAO document entitled “CORSIA Methodology for Calculating Actual Life Cycle Emissions Values”** that is available on the ICAO CORSIA website, has been applied correctly.

“ICAO Documents” Referenced in Annex 16 Vol. IV, and associated “Supporting Documents”

ICAO document
CORSIA Sustainability Criteria for CORSIA Eligible Fuels

ICAO document
CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes

ICAO document
CORSIA Approved Sustainability Certification Schemes

ICAO document
CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels

CORSIA Supporting Document
LCA Methodology

ICAO document
CORSIA Methodology for Calculating Actual Life Cycle Emissions Values

Two Methods for Determining Life Cycle Emissions for CORSIA Eligible Fuels

Two methods to determine life cycle emissions value for CORSIA Eligible Fuels

1. CORSIA default life cycle emissions values
2. CORSIA methodology for calculating actual life cycle emissions values

Default LCA values

- Values developed by international team, approved by ICAO Council, and provided in ICAO Document, “CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels”

Actual LCA values using CORSIA Methodology

- Details within ICAO Document, “CORSIA Methodology for Calculating Actual Life Cycle Emissions Values”
- Airline operator / fuel producer can work with an eligible Sustainability Certification Scheme (SCS) to seek a core LCA value representative of their specific fuel production pathway
- SCS will need to prepare a technical report justifying actual LCA value
- Methodology uses attributional process with energy allocation of emissions among co-products to determine core LCA value
- Methodology provides a means to get an ILUC value of zero or negative ILUC values
- Methodology provides credits for MSW Landfill and Recycling Emissions
- Developing rules wherein additional credits could be considered in the future

Sustainability Certification Schemes

- CORSIA Eligible Fuel need to come from a fuel producer that is certified by an ICAO Council approved Sustainability Certification Scheme (SCS)
- SCSs need to meet requirements of ICAO document entitled "CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes"
- Two SCSs approved for CORSIA:
 - International Sustainability and Carbon Certification (ISCC)
 - Roundtable on Sustainable Biomaterials (RSB)
- Applications by SCSs being reviewed on an ongoing basis by the SCS Evaluation Group (SCSEG).
- SCSs interested in being considered should complete an application (link below).



To download document: <https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20document%20004%20-%20Approved%20SCSs.pdf>

Sustainability Criteria for CORSIA Pilot Phase (until Dec-31-2023) – applies to SAF and LCAF

Compiled within the ICAO Document “CORSIA Sustainability Criteria for CORSIA Eligible Fuels”



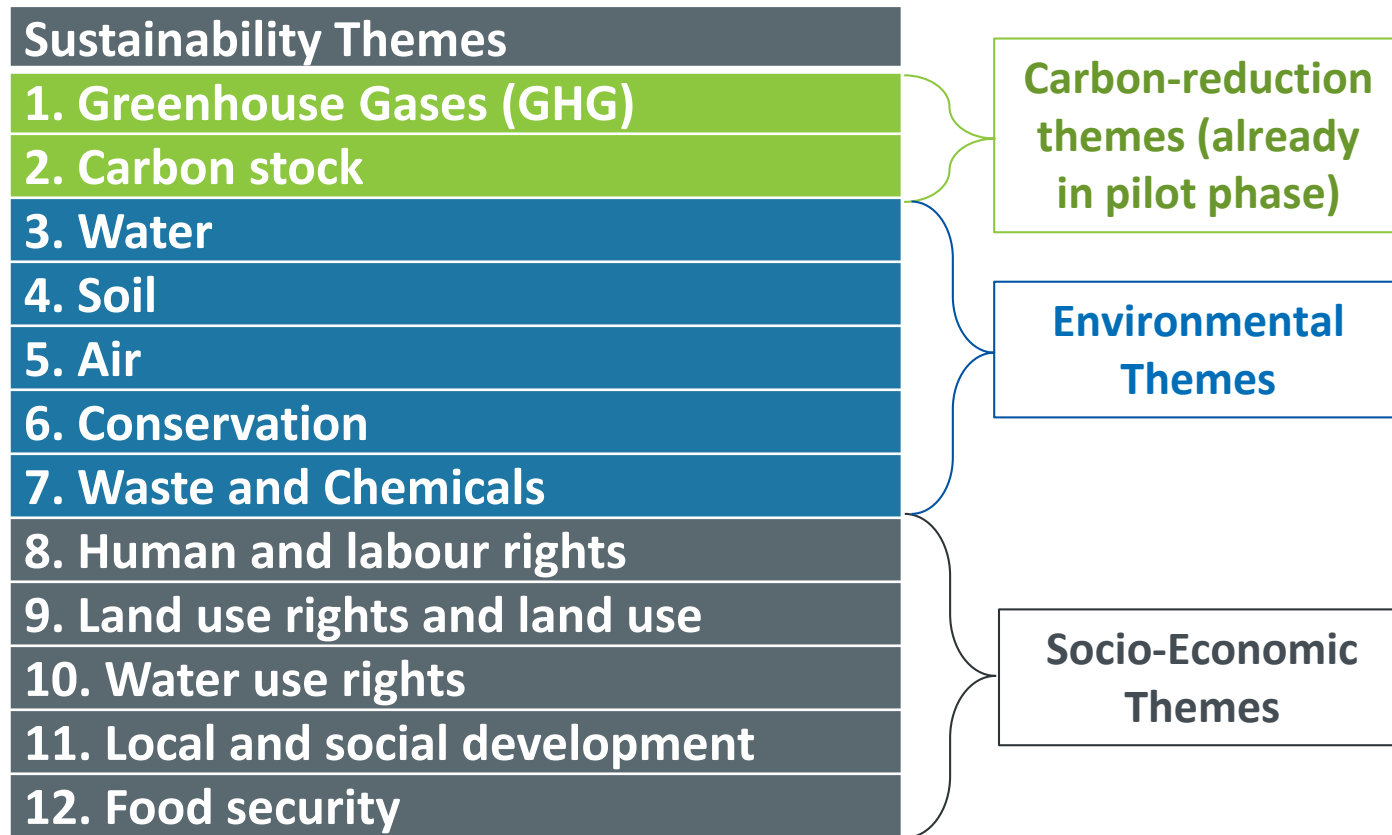
Theme	Principle	Criteria
1. Greenhouse Gases (GHG)	Principle: CORSIA eligible fuel should generate lower carbon emissions on a life cycle basis.	Criterion 1: CORSIA eligible fuel shall achieve net greenhouse gas emissions reductions of at least 10% compared to the baseline life cycle emissions values for aviation fuel on a life cycle basis.
2. Carbon stock	Principle: CORSIA eligible fuel should not be made from biomass obtained from land with high carbon stock.	<p>Criterion 1: CORSIA eligible fuel shall not be made from biomass obtained from land converted after 1 January 2008 that was primary forest, wetlands, or peat lands and/or contributes to degradation of the carbon stock in primary forests, wetlands, or peat lands as these lands all have high carbon stocks.</p> <p>Criterion 2: In the event of land use conversion after 1 January 2008, as defined based on IPCC land categories, direct land use change (DLUC) emissions shall be calculated. If DLUC greenhouse gas emissions exceed the default induced land use change (ILUC) value, the DLUC value shall replace the default ILUC value.</p>

To download CORSIA Sustainability Criteria for CORSIA Eligible Fuels document:
<https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20document%2005%20-%20Sustainability%20Criteria.pdf>



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Potential Additional CORSIA Sustainability Criteria (post Pilot Phase) – Ongoing work within ICAO



Full range of criteria will ensure environmental, social and economic sustainability of SAF.



Draft Sustainability Criteria for SAF for Post Pilot Phase

- Draft criteria taken from CAEP/11 Report (Doc 10126) – these are subject to change based on future ICAO Council decisions
- Criteria for themes 1-2 are in use for CORSIA Pilot Phase
- Criteria for themes 3-12 are under consideration by the ICAO Council

Theme	Principle	Criteria
1. Greenhouse Gases (GHG)	Principle: Sustainable alternative jet fuel should generate lower carbon emissions than conventional kerosene on a life cycle basis.	Criterion 1: Sustainable alternative jet fuel shall achieve net greenhouse gas emissions reductions of at least 10% compared to fossil jet fuel on a life cycle basis.
2 Carbon stock	Principle: Sustainable alternative jet fuel should not be made from biomass obtained from land with high carbon stock.	Criterion 1: Sustainable alternative jet fuel shall not be made from biomass obtained from land converted after 1 January 2008 that was primary forests, wetlands, or peat lands and/or contributes to degradation of the carbon stock in primary forests, wetlands, or peat lands as these lands all have high carbon stocks.
		Criterion 2: In the event of land use conversion after 1 January 2008, as defined based on IPCC land categories, direct land use change (DLUC) emissions shall be calculated. If DLUC greenhouse gas emissions exceed the default induced land use change (ILUC) value, the DLUC value shall replace the default ILUC value.
3. Water	Principle: Production of sustainable alternative jet fuel should maintain or enhance water quality and availability.	Criterion 1: Operational practices shall be implemented to maintain or enhance water quality.
		Criterion 2: Operational practices shall be implemented to use water efficiently and to avoid the depletion of surface or groundwater resources beyond replenishment capacities.
4. Soil	Principle: Production of sustainable alternative jet fuels should maintain or enhance soil health.	Criterion 1: Agricultural and forestry best management practices for feedstock production or residue collection shall be implemented to maintain or enhance soil health, such as physical, chemical and biological conditions.
5. Air	Principle: Production of sustainable alternative jet fuel should minimize negative effects on air quality.	Criterion 1: Air pollution emissions shall be limited.
6. Conservation	Principle: Production of sustainable alternative jet fuel should maintain or enhance biodiversity, conservation and ecosystem services.	Criterion 1: Sustainable alternative jet fuel shall not be made from biomass obtained from areas that are protected for their biodiversity, conservation value, or ecosystem services unless evidence is provided that shows the activity does not interfere with the protection purposes.
		Criterion 2: Low invasive-risk feedstock shall be selected for cultivation and appropriate controls shall be adopted with the intention of preventing the uncontrolled spread of cultivated non-native species and modified microorganisms
		Criterion 3: Operational practices shall be implemented to avoid adverse effects on areas that are protected for their biodiversity, conservation value, or ecosystem services.
7. Waste and Chemicals	Principle: Production of sustainable alternative jet fuel should promote responsible management of waste and use of chemicals.	Criterion 1: Operational practices shall be implemented to ensure that waste arising from production processes as well as chemicals used are stored, handled and disposed of responsibly.
		Criterion 2: Operational practices shall be implemented to limit or reduce pesticide use.
8. Human and labour rights	Principle: Production of sustainable alternative jet fuel should respect human and labour rights.	Criterion 1: Sustainable alternative jet fuel production shall respect human and labour rights.
9. Land use rights and land use	Principle: Production of sustainable alternative jet fuel should respect land rights and land use rights including indigenous and/or customary rights.	Criterion 1: Sustainable alternative jet fuel production shall respect existing land rights and land use rights including indigenous peoples' rights, both formal and informal.
10. Water use rights	Principle: Production of sustainable alternative jet fuel should respect prior formal or customary water use rights.	Criterion 1: Sustainable alternative jet fuel production shall respect the existing water use rights of local and indigenous communities.
11. Local and social development	Principle: Production of sustainable alternative jet fuel should contribute to social and economic development in regions of poverty.	Criterion 1: Sustainable alternative jet fuel production shall strive to, in regions of poverty, improve the socioeconomic conditions of the communities affected by the operation.
12. Food security	Principle: Production of sustainable alternative jet fuel should promote food security in food insecure regions.	Criterion 1: Sustainable alternative jet fuel production shall, in food insecure regions, strive to enhance the local food security of directly affected stakeholders.

Ongoing Work in ICAO on Fuels

- Development / approval of sustainability criteria for post-pilot phase of CORSIA for both SAF and LCAF
- Maintenance of the life cycle accounting method in CORSIA:
 - Calculation of default life cycle emission values for Sustainable Aviation Fuels (including both core LCA values and ILUC values).
 - Maintenance / expansion of the actual life cycle value process
 - Classification of feedstocks as wastes, co-products and main products
 - Development of approaches to minimize the risk of double counting
- Development of guidance on potential policies for the deployment of SAF
- Evaluation of SAF and LCAF availability through 2035 (FTG) and through 2070 (LTAG-TG)
- Assessment of new technologies for SAF and LCAF production



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