EASA
European Union Aviation Safety Agency

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CAPACITY BUILDING ON SAF & CORSIA ELIGIBLE FUELS NAMIBIA

What is meant by Life Cycle Emissions, Sustainability Criteria and Sustainability Certification?

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Understanding Sustainability Criteria

What do we mean by Sustainability Criteria?

- A set of requirements to ensure the sustainable quality of a product (SAF) and its sustainable production and supply
- These must be met to ensure the product (SAF) meets the required sustainability status or certification requirements for a certain certification scheme
- Sustainability Criteria requirements differ under the various regulatory or voluntary schemes
- There is no one set of Sustainability Criteria that covers all schemes – important to ensure the right Sustainability Criteria are considered depending on which scheme the SAF is to be accounted under

Sustainability Criteria – what is assessed?

GHG emissions reductions

Land use impacts

Other environmental impacts

Socio-economic impacts

Sustainability Criteria - Themes

1. Greenhouse Gas (GHG) Emissions Reductions
2. Carbon Stock
3. GHG Reduction Permanence

GHG and Land Use Themes

4. Water
5. Soil
6. Air
7. Conservation
8. Waste and Chemicals
9. Seismic and Vibrational Impacts

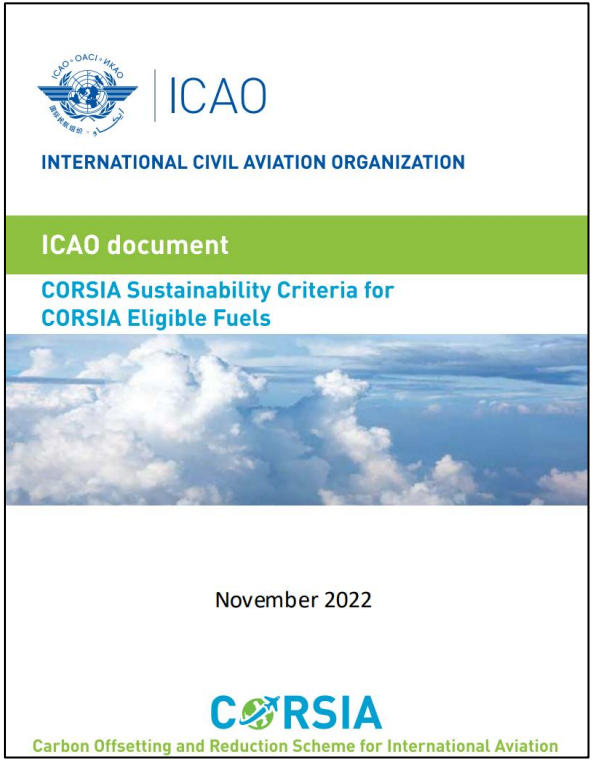
Environmental Themes

10. Human and Labour Rights
11. Land Use Rights and Land Use
12. Water Use Rights
13. Land and Social Development
14. Food Security

Socio-Economic Themes

Sustainability Criteria for CORSIA Eligible Fuels

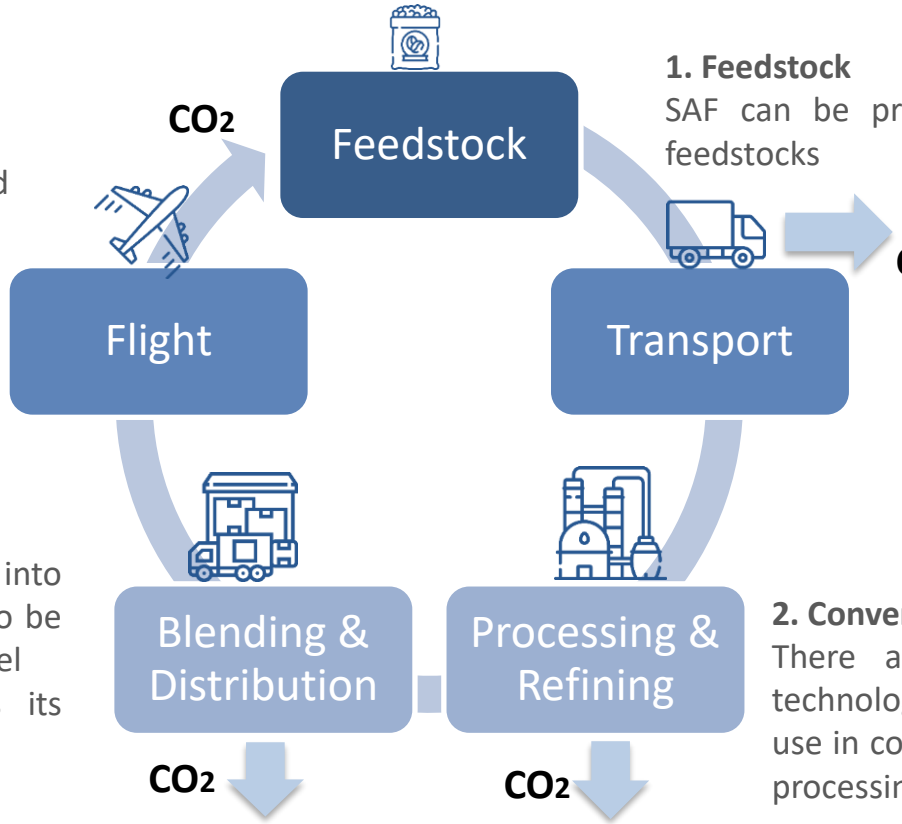
- Provides Sustainability Criteria for the following fuels:
  - **CORSIA Eligible Fuel** (CEF)
    Produced before 1 Jan 2024
  - **CORSIA SAF** (CSAF)
    Produced after 1 Jan 2024
  - **CORSIA Lower Carbon Aviation Fuel** (LCAF)
    Produced after 1 Jan 2024
- Includes guidance on the application of the Sustainability Criteria



Understanding
Life Cycle Emissions

What does “on a life cycle basis” mean?

4. End use
Certified SAF is a drop-in fuel and can be safely used in existing engines



1. Feedstock
SAF can be produced from a variety of feedstocks

emissions from feedstock cultivation and land use change

2. Conversion
There are currently 8 feedstock-technology pathways certified for use in commercial aviation plus 3 co-processing pathways

3. Downstream logistics
Before SAF can be delivered into airport storage tanks, it needs to be blended with conventional jet fuel
Each conversion pathway has its own blending limit

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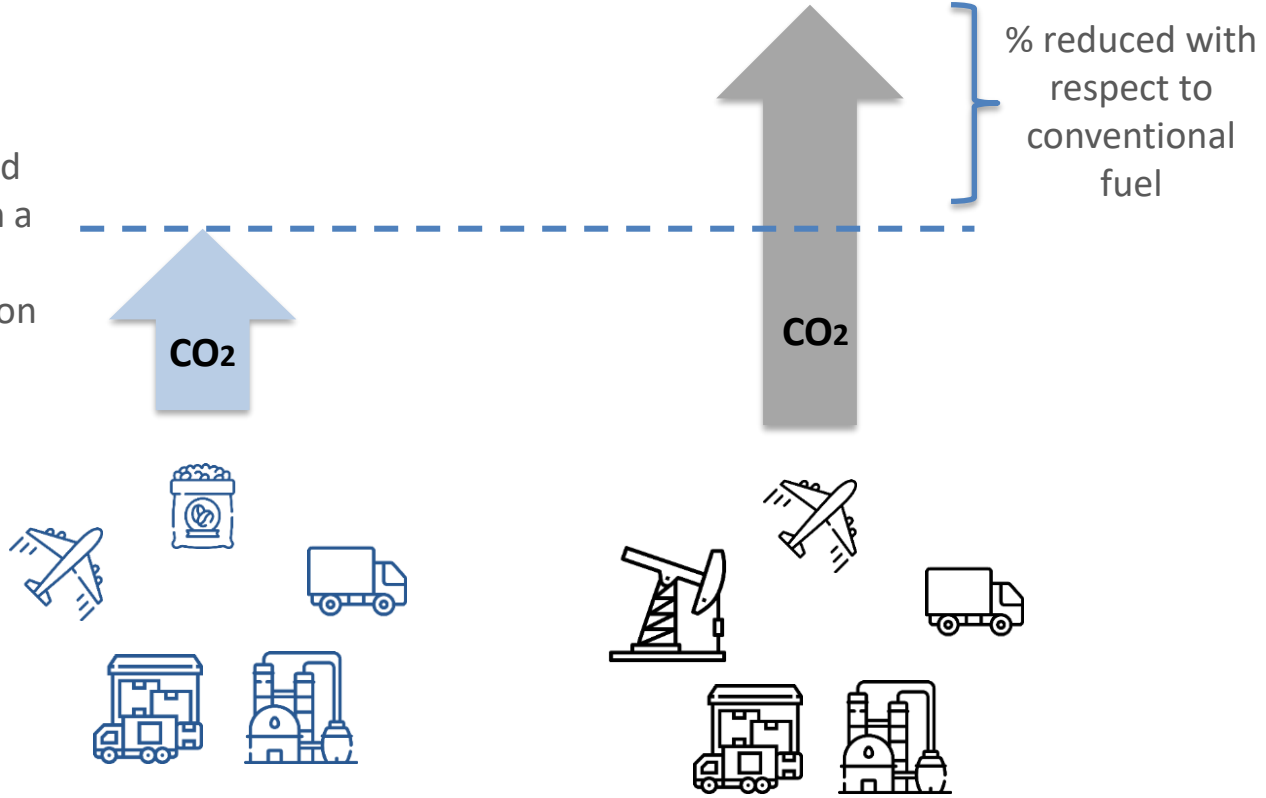
What does emissions are reduced “on a life cycle basis” mean?

Emissions need to be compared with conventional fuel through a Life Cycle Assessment (LCA) to quantify the emissions reduction achieved



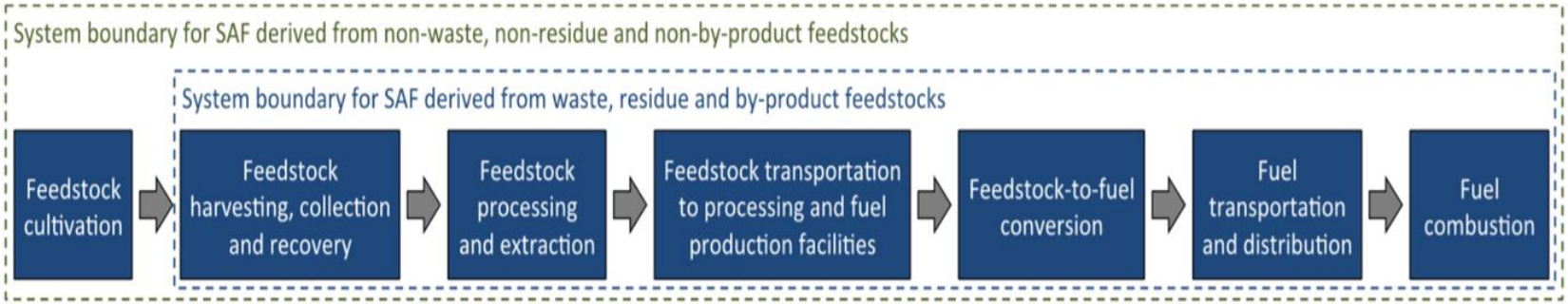
The combustion emissions of SAF are comparable to fossil jet fuel!

Why does the reduction in lifecycle emissions compared to conventional aviation fuel need to be verified?

- → Providing assurance that SAF achieves greenhouse gas (GHG) emissions reductions over its full life cycle compared to conventional fossil-based aviation fuel is crucial
- → Regulatory frameworks (e.g., CORSIA, ReFuelEU Aviation) detail specific emissions savings thresholds that SAF must meet to be considered eligible under those schemes/frameworks
- → GHG emissions occur along the full life cycle of SAF, including feedstock production, processing and refining, storage, transport and distribution and combustion. Assessing all these emissions is essential to ensure the full GHG impact of SAF is considered
- → Certification schemes provide a standardized framework for how GHG emissions are calculated and verified along the SAF supply chain – in line with the GHG emissions methodologies defined in the relevant regulatory framework (e.g., CORSIA or EU RED)

Calculating life cycle emissions values

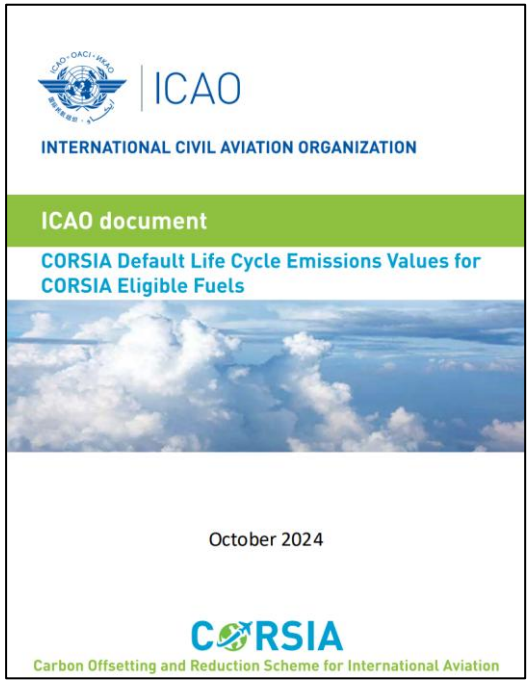
- Life cycle emissions values (L_{CEF} in the context of CORSIA) are calculated considering the CO_2 emissions from all parts of the production process
- The type of feedstock, conversion process and region where the fuel is produced are important considerations

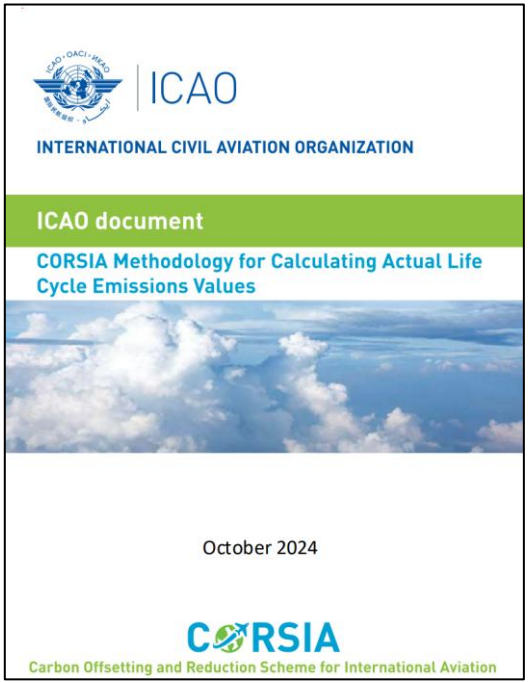


- Waste, residue and by-product feedstocks incur zero GHG emissions during the feedstock production step of the lifecycle; emissions generated during their collection, recovery and extraction, and processing of wastes, residues and by-products, however, are included

How to determine the life cycle emissions value of a CORSIA Eligible Fuel

→ There are two possibilities to obtain the life cycle emissions value of a CORSIA Eligible Fuel:





Example of L_{CEF} from the ICAO Default Values Document

Table 2. CORSIA Default Core LCA Values for CORSIA Eligible Fuels produced with the HEFA Conversion Process

Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability Provisions
Tallow		22.5	This value can be applied to CEF batches produced until 31 December 2029.
Beef Tallow	relevant lifecycle starts with transportation from slaughterhouse to rendering facility	29.7	
Poultry fat	relevant lifecycle starts with transportation from slaughterhouse to rendering facility	33.7	
Lard fat	relevant lifecycle starts with transportation from slaughterhouse to rendering facility	27.8	
Mixed Animal Fats	relevant lifecycle starts with transportation from slaughterhouse to rendering facility	28.6	
Used cooking oil		13.9	
Palm fatty acid distillate		20.7	
Corn oil	Oil from dry mill ethanol plant	17.2	
Soybean oilseed		40.4	
Rapeseed/Canola oilseed		47.4	
Palm fresh fruit bunches	At the oil extraction step, at least 85% of the biogas released from the Palm Oil Mill Effluent (POME) treated in anaerobic ponds is captured and oxidized.	37.4	
Palm fresh fruit bunches	At the oil extraction step, less than 85% of the biogas released from the Palm Oil Mill Effluent (POME) treated in anaerobic ponds is captured and oxidized.	60.0	
Brassica carinata oilseed		34.4	
Camelina oilseed		42.0	
Jatropha oilseed	Meal used as fertilizer or electricity input	46.9	
Jatropha oilseed	Meal used as animal feed after detoxification	46.8	
Non-standard coconuts	The default value is valid if the hydrogen used is not produced from coal. If hydrogen is produced from coal, a correction value of 5.17 gCO2e/MJ needs to be added to the core LCA value.	26.9	

Calculating the life cycle emissions (L_{CEF}) value of a CORSIA Eligible Fuel

→ The life cycle emissions value of a CORSIA Eligible Fuel is made up of two main elements:

Core Life Cycle Assessment (LCA) emissions

- Feedstock cultivation
- Feedstock harvesting, collection and recovery
- Feedstock processing and extraction
- Feedstock transportation to processing and fuel distribution facilities
- Feedstock-to-fuel conversion processes
- Fuel transportation and distribution to the blend point
- Fuel transportation from the blending point to the aircraft uplift location
- Fuel combustion in an aircraft engine

+

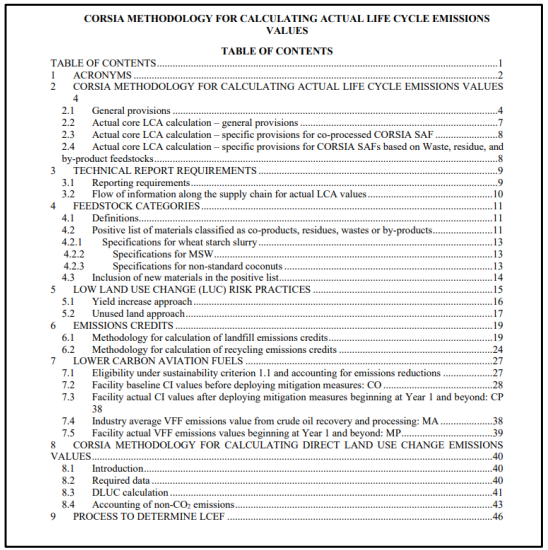
Induced land-use change (ILUC) emissions

- CORSIA Eligible Fuel production may require additional land to be used and generate land use change emissions
- This could occur where the new CORSIA Eligible Fuel production is taking place (Direct land use change), but also in other areas due to displacement of crops (or animals) for which the land was previously used (indirect land use change)
- Assessing ILUC emissions accounts for this by evaluating GHG released from conversion of natural vegetation, soil organic carbon, oxidation of peatland and sequestered biomass

= L_{CEF}

ICAO CORSIA Methodology for Calculating Actual Life Cycle Emissions Values Document – what's included?

- Acronyms
- CORSIA Methodology for Calculating Actual Life Cycle Emissions Values
- Technical Report Requirements
- Feedstock Categories
- Low Land Use Change (LUC) Risk Practices
- Emissions Credits
- Lower Carbon Aviation Fuels
- CORSIA Methodology for Calculating Direct Land Use Change Emissions Values
- Process to determine L_{CEF}



CORSIA METHODOLOGY FOR CALCULATING ACTUAL LIFE CYCLE EMISSIONS VALUES

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Understanding Sustainability Certification

What do we mean by Sustainability Certification?

- The process whereby a product, service or organisation is assessed against a set of criteria or standards to determine its **environmental**, **social** and **economic** sustainability performance
- These assessments/certifications are generally conducted by independent third-party organisations to identify and support sustainability practices
- They are also used by government authorities to ensure compliance with specific regulations
- Sustainability certification plays a crucial role in promoting transparency, accountability and continuous improvement

The role of sustainability certification

- → Performance-based schemes that aim to achieve a certain standard and include principles, criteria and indicators
- → Sustainability certification plays a key role in ensuring that SAF production can be considered sustainable according to the different dimensions

Its objective is to guarantee:

Sustainability in the production of feedstock

Traceability of sustainable materials throughout the supply chain

Verified reduction of lifecycle emissions

Sustainability Certification Schemes

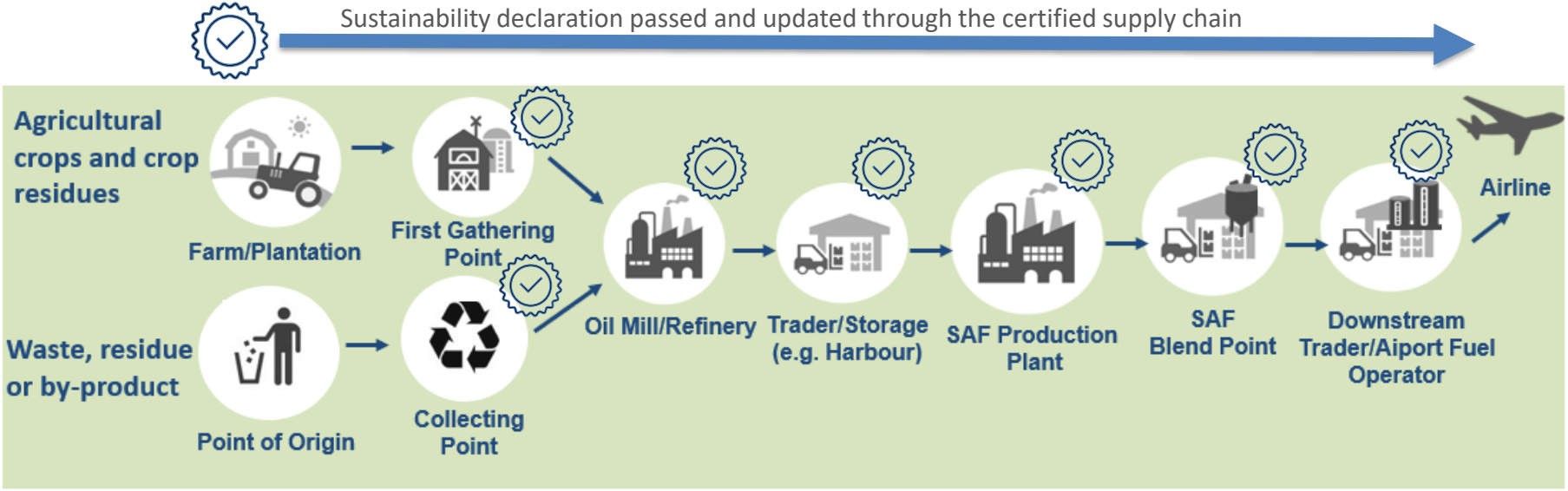
- A sustainability certification standard is a structured framework or set of criteria used to assess and verify the sustainability performance of products, services or organisations

- Several organisations offer such standards under their sustainability certification schemes (SCS).

- These schemes operationalise and implement sustainability certification standards through accreditation, auditing and certification processes, ensuring credibility and consistency in certification

Certification across the supply chain

- Every supply chain element is individually certified
- Auditors verify compliance with the standard's requirements via audit checklists



Farm/Plantation refers to the agricultural operations where crops are cultivated, or residues collected
Point of Origin refers to the operation where the waste is generated
Both are usually covered under the First Gathering Point/Collection Point certification, but individual certification is also possible

Traceability and chain of custody through the supply chain

- ‘Traceability’ – the ability to identify and trace the origin, processing history, distribution, and location of products (e.g., sustainably certified SAF) and how they move through the supply chains

- ‘Chain of Custody’ – the process of transferring, monitoring and controlling inputs and outputs and related information through the supply chain i.e., provides assurance that a given batch of SAF is associated with a specific set of characteristics (e.g., savings in GHG emissions) and that the information on these characteristics is also transferred, monitored and controlled through the supply chain

- Demonstrating ‘traceability’ and ‘chain of custody’ throughout the supply chain is essential as it forms the basis for any claims made about a specific product, i.e., SAF, were supply chains can be complex

Traceability & Chain of Custody

- → Tracing certified product as it moves through the supply chain is the basis for any claims made about the final renewable fuel.
- → It is essential to be sure that renewable fuel volumes and emissions reductions counted under regulations are really being delivered and realized.
- → As a general rule, all entities along the supply chain need to undergo individual certification. This way, every entity is regularly audited for continued compliance with the certification scheme's requirements.
- → Sustainability information (including, but not limited to, information on carbon intensity) is forwarded through the supply chain via sustainability documentation, "Proof of Sustainability", or PoS.
- → Only certified entities can provide and receive these documents. Exception: entities that only receive and use the fuel→ airlines

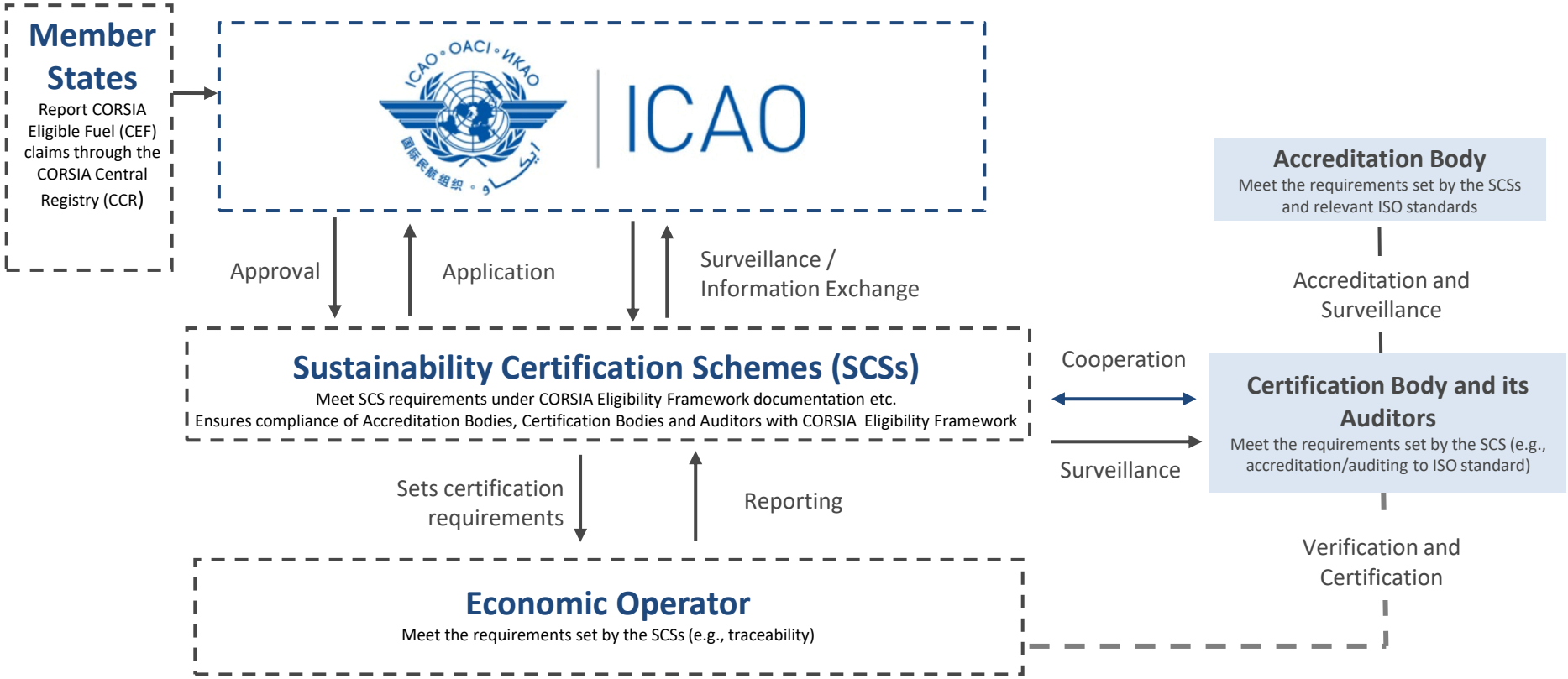
Sustainability in feedstock production

- SAF can be produced from a wide range of feedstocks – including crops, wastes, agricultural or forestry residues, processing residues and by-products

- For primary biomass (e.g., crops) certification aims to ensure that the feedstock is not cultivated on certain valuable lands (e.g., those with high carbon stock).
  Feedstock cultivation must also avoid negative effects on the environment (e.g., water quality) as well as detrimental socio-economic effects (e.g., human and labour rights).

- For wastes and residues (e.g., used cooking oil), the focus is on verifying that those feedstocks are genuine wastes and residues - i.e., that they have not been intentionally modified or contaminated to count as waste or residue

The Sustainability Certification system



Source: adapted from ICAO website

Certification Bodies and Accreditation Bodies

Certification Bodies

- Certification bodies are independent, third-party organisations that handle the certification process, including the assessment of the individual economic operator's compliance with the requirements of the certification schemes
- Certification bodies are authorized by the certification scheme's owners (e.g., RSB) to issue certificates of compliance to economic operators, provided the operators comply with the requirements defined under the certification scheme
- Commonly, certification bodies are required to conform with relevant ISO standards

Accreditation Bodies

- Certification bodies themselves may be subject to audits by their competent national authority
- However, their main "license to operate" is generally derived from the certification body's accreditation by so-called accreditation bodies
- Accreditation refers to the independent, third-party evaluation of a conformity assessment body (i.e. a certification body) against recognized standards, conveying formal demonstration of its impartiality and competence to carry out specific conformity assessment tasks (such as certification)
- Accreditation bodies have the essential role of continuously verifying that certification bodies work in conformance with relevant ISO standards and the requirements set by the certification schemes the certification bodies are cooperating with

CORSIA Approved Sustainability Certification Schemes

→ International Sustainability and Carbon Certification

→ Roundtable on Sustainable Biomaterials

→ ClassNK SCS

Sustainability Criteria relating to CORSIA Eligible Fuel (CEF) batches produced before 1 January 2024

Greenhouse Gas and Land Use themes

Theme	Principle
1. Greenhouse Gas (GHG) Emissions Reductions	CORSIA eligible fuel should generate lower carbon emissions on a life cycle basis
2. Carbon Stock	CORSIA eligible fuel should not be made from biomass obtained from land with high carbon stock

- Details of how the specific criteria for both themes is evaluated is detailed within the ICAO document 'CORSIA Sustainability Criteria for CORSIA Eligible fuels'
- Compliance with these criteria is granted based on an independent attestation by the Sustainability Certification Scheme (SCS)
- A fuel producer can produce batches of CEF for 365 days after it has been certified by a SCS for compliance with Sustainability Criteria (it shall be recertified after this period)

Land Use Change

Direct land use change (DLUC)	Induced land use change (ILUC)
Direct land use change occurs when feedstock cultivation modifies the land use on the land where it is grown (i.e., biomass cultivation displaces a different former land use Example: Grassland is converted to arable crop production land	Induced land use change occurs when agricultural land previously destined for food and feed markets is diverted to biofuel (SAF) production Since food and feed demand still needs to be satisfied, additional land, including potentially high carbon stock areas may be turned into agricultural land

Sustainability Criteria relating to batches of CORSIA SAF (SAF) produced after 1 January 2024

Greenhouse Gas and Land Use themes

Theme	Principle
1. Greenhouse Gas (GHG) Emissions Reductions	CORSIA eligible fuel should generate lower carbon emissions on a life cycle basis
2. Carbon Stock	CORSIA eligible fuel should not be made from biomass obtained from land with high carbon stock
3. GHG Reduction Permanence	Emissions reductions attributed to CORSIA SAF should be permanent

- Compliance with these criteria is granted based on an independent attestation by the Sustainability Certification Scheme (SCS)

Environmental themes

Theme	Principle
4. Water	Production of CORSIA SAF should maintain or enhance water quality and availability
5. Soil	Production of CORSIA SAF should maintain or enhance soil health
6. Air	Production of CORSIA SAF should minimize negative effects on air quality
7. Conservation	Production of CORSIA SAF should maintain biodiversity, conservation value, and ecosystem services
8. Waste and Chemicals	Production of CORSIA SAF should promote responsible management of waste and use of chemicals
9. Seismic and Vibrational Impacts	Not applicable

Compliance with themes 4-8 will be assessed by the Sustainability Certification Scheme considering guidance approved by the ICAO Council

Socio-economic themes

Theme	Principle
10. Human and Labour Rights	Production of CORSIA SAF should respect human and labour rights
11. Land Use Rights and Land Use	Production of CORSIA SAF should respect land rights and land use rights including indigenous and/or customary rights
12. Water Use Rights	Production of CORSIA SAF should respect prior formal or customary water use rights
13. Land and Social Development	Production of CORSIA SAF should contribute to social and economic development in regions of poverty
14. Food Security	Production of CORSIA SAF should promote food security in food insecure regions

- Compliance with Themes 10 to 12 can be demonstrated to the SCS by a national attestation from the State
- Compliance with Themes 13 and 14 will be demonstrated to the SCS by the economic operator reporting to the SCS the actions being taken to meet the related criteria

Next Session:

SAF Feedstock


Capacity Building
GHG Emissions
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RSB
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Risk
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