RSB
Roundtable on Sustainable Biomaterials
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International Sustainability & Carbon Certification

Sustainability Certification of SAF

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Thomas Bock, Aviation Lead, ISCC System

Sustainable Aviation Fuel Webinars; EU-SEA CCCA CORSIA
28 November 2023

Your Speakers for Today

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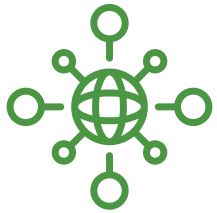
Our work across 3 areas

Certification

Certification to the RSB Standard covers feedstock production, entire supply chains, and novel technologies, including fuel, biomass and material products from bio-based and recycled carbon, including fossil waste.

Implementation

Technical and strategic advice, hands-on implementation, staff training and research services at a regional and global level. We work on projects with individual partners. We also run large landscape-level projects to develop bioeconomy roadmaps with multiple partners.

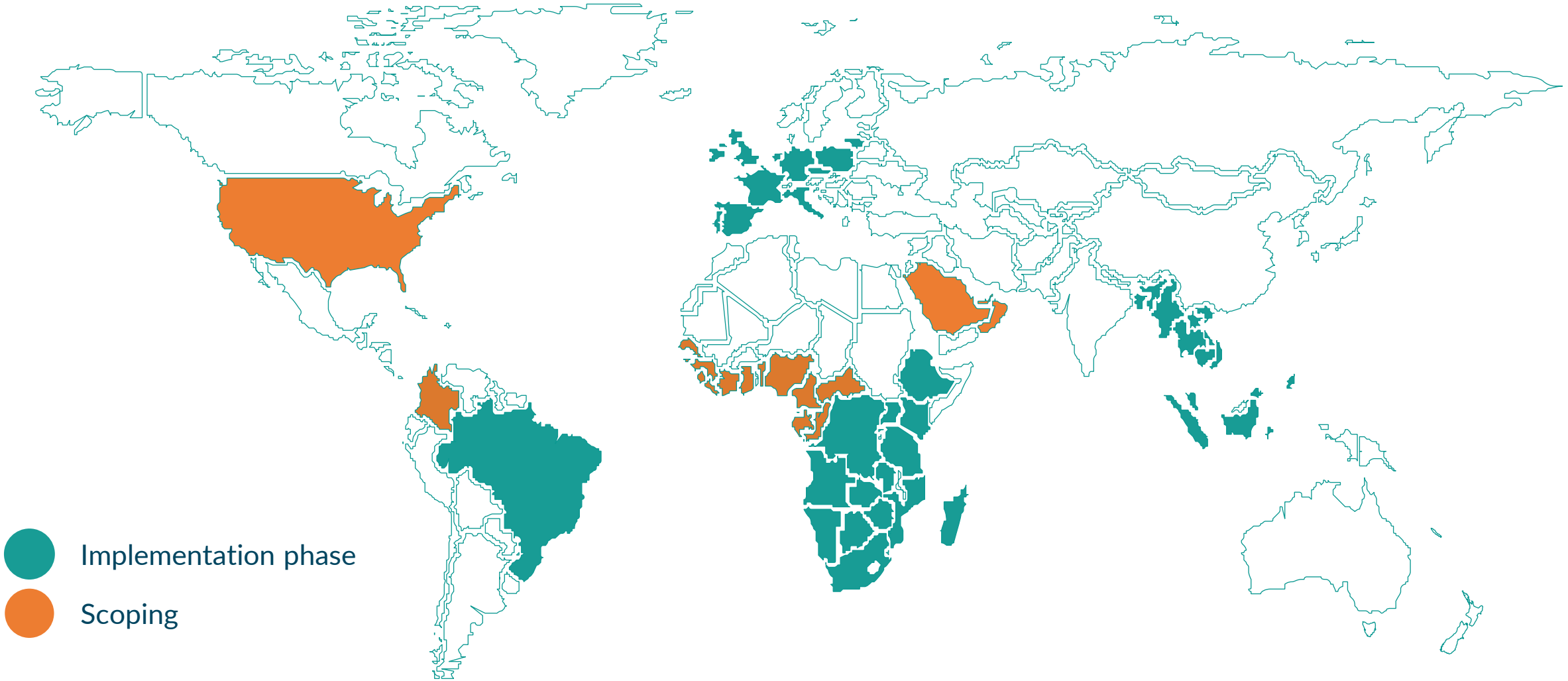


Convening

Convening stakeholder groups across private sector, industry, govts, NGOs & academia through events, working groups, platforms to define sustainability standards and best practices, generate interest for action, and drive consensus.

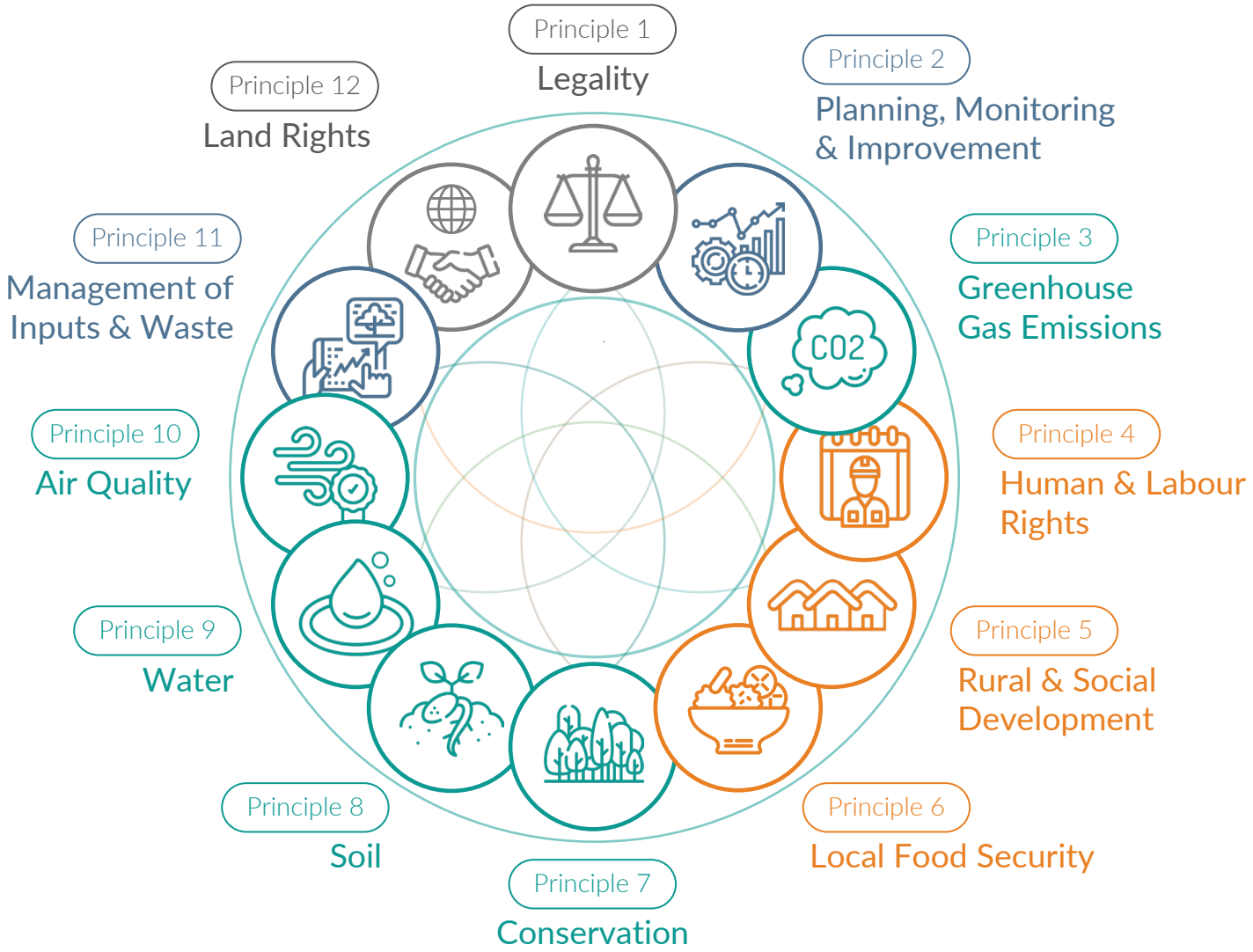
RSB global membership is highly diverse
A wide range of organisations across supply chains, regions and industries

RSB Landscape-Level Programme



Holistic approach supporting our ambition to create positive impact

- Legal
- Management
- Environmental
- Social



Who We Are

The International Sustainability and Carbon Certification (ISCC) is an independent multi-stakeholder initiative and leading certification system for sustainable, fully traceable, deforestation-free, and climate-friendly supply chains. Under our certification, we ensure environmentally, socially, and economically sustainable production.

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51000+ Total certificates issued

136 Total countries

9000+ Certified economic operators

1600+ Total ISCC auditors trained

200+ ISCC training courses conducted

250+ Current ISCC association members

50+ Current Cooperating certification bodies

Data as of November 2023

The ISCC System is governed by the ISCC Association, a multi-stakeholder non-profit organization with currently 250+ members

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A wide range of regulatory frameworks use certification schemes to ensure the sustainability and thus eligibility of SAF

Examples

ICAO CORSIA

- Offsetting scheme to ensure carbon-neutral growth of international aviation from 2020
- Airlines can use SAF to reduce their offsetting obligations under CORSIA
- Airlines can only reduce their offsetting obligations under CORSIA through SAF that is **certified under an ICAO-approved certification scheme**

ReFuelEU Aviation Regulation

- Sets a mandate on fuel suppliers to supply a defined percentage of SAF to EU airports, starting 2025
- 2% of SAF in 2025, increasing to 70% by 2050
- Fuel suppliers obligated under ReFuelEU must supply SAF that is **certified under an EU RED II-approved certification scheme**

UK SAF Mandate (upcoming)

- SAF mandate set to start in 2025, requiring 10% SAF blend by 2030
- Under the SAF mandate, UK foresees **use of certification schemes** similarly to those currently accepted under the UK RTFO

SAF blender's tax credit under the US IRA*

- Grants tax credits for SAF that achieves a life cycle emissions reduction of at least 50%
- Mention of **ICAO-approved certification schemes** under CORSIA for demonstrating compliance of SAF

*US IRA = US Inflation Reduction Act

EU Emissions Trading System

- Requires airlines to buy and surrender allowances for each metric ton of CO_2 emitted on intra-EU flights
- Airlines can use SAF to reduce the allowances they will need to buy and surrender
- Airlines can only account for the use of SAF with zero emissions if it is **certified under an EU RED II-approved certification scheme**

UK Emissions Trading System

- Under the UK ETS, similarly to the EU ETS, airlines can use SAF to reduce the allowances they will need to buy and surrender
- Airlines can only account for the use of SAF with zero emissions if it is **certified under an RTFO-approved certification scheme**

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01

The sustainability framework for CORSIA eligible fuels

02

The CORSIA sustainability certification process and the role of SCS

03

Feedstock certification

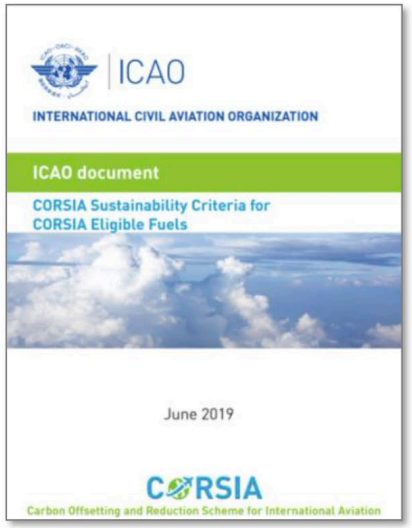
All requirements and procedures relevant for CORSIA Eligible Fuels are laid out in several key ICAO documents

ICAO CORSIA Implementation Elements	ICAO documents
CORSIA States for Chapter 3 State Pairs	1. CORSIA States for Chapter 3 State Pairs
ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT)	2. ICAO CORSIA CO_2 Estimation and Reporting Tool
CORSIA Eligible Fuels	3. CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes 4. CORSIA Approved Sustainability Certification Schemes 5. CORSIA Sustainability Criteria for CORSIA Eligible Fuels 6. CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels 7. CORSIA Methodology for Calculating Actual Life Cycle Emissions Values
CORSIA Eligible Emissions Units	8. CORSIA Eligible Emissions Units 9. CORSIA Emissions Unit Eligibility Criteria
CORSIA Central Registry (CCR)	10. CORSIA Central Registry: Information and Data for the Implementation of CORSIA 11. CORSIA Aeroplane Operator to State Attributions 12. CORSIA 2020 Emissions 13. CORSIA Annual Sector's Growth Factor (SGF) 14. CORSIA Central Registry (CCR): Information and Data for Transparency

Source: ICAO website: https://www.icao.int/environmental-protection/CORSIA/Pages/implementation-elements.aspx

The CORSIA sustainability criteria cover all major sustainability themes

CORSIA sustainability criteria for CORSIA eligible fuels
First global approach to sustainability for an industry sector



Sustainability Themes	
1. Greenhouse Gases (GHG)	Carbon-reduction themes (CORSIA pilot phase, 2021-2023)
2. Carbon stock	
3. Water	Environmental and socio-economic Themes for SAF (After CORSIA pilot phase, from 2024)
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	

Sustainability criteria for LCAF is under consideration by Council

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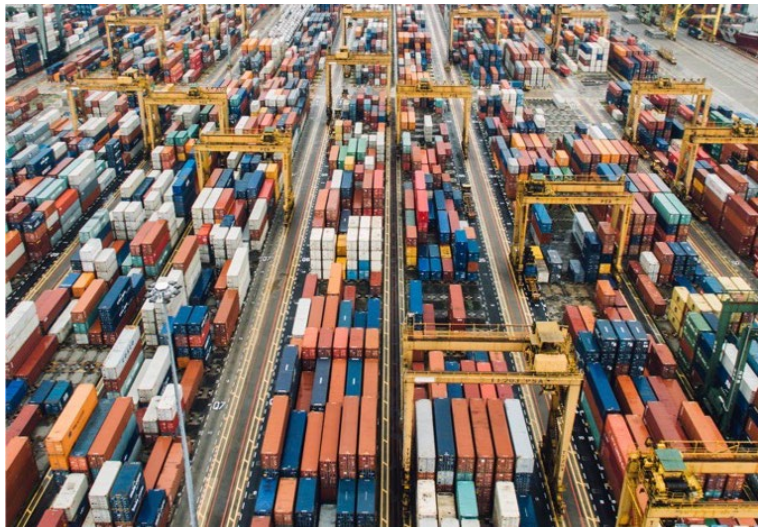
Feedstock certification

Certification can play a key role in ensuring that the production of renewable fuels is sustainable and leads to GHG emission reductions

Sustainability certification schemes (SCS) aim to ensure

Sustainability in feedstock production



Traceability of sustainable materials through the supply chain

Verified reduction in life cycle emissions

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CORSIA requires audits to be conducted via third-party certification

- **ICAO developed a CORSIA-specific certification process** for SAF building from existing approaches (e.g., as practiced under EU RED)
- ICAO requires the use of third-party certification and defines **clear roles and responsibilities** for the different organizations involved in CORSIA certification (Figure 1)

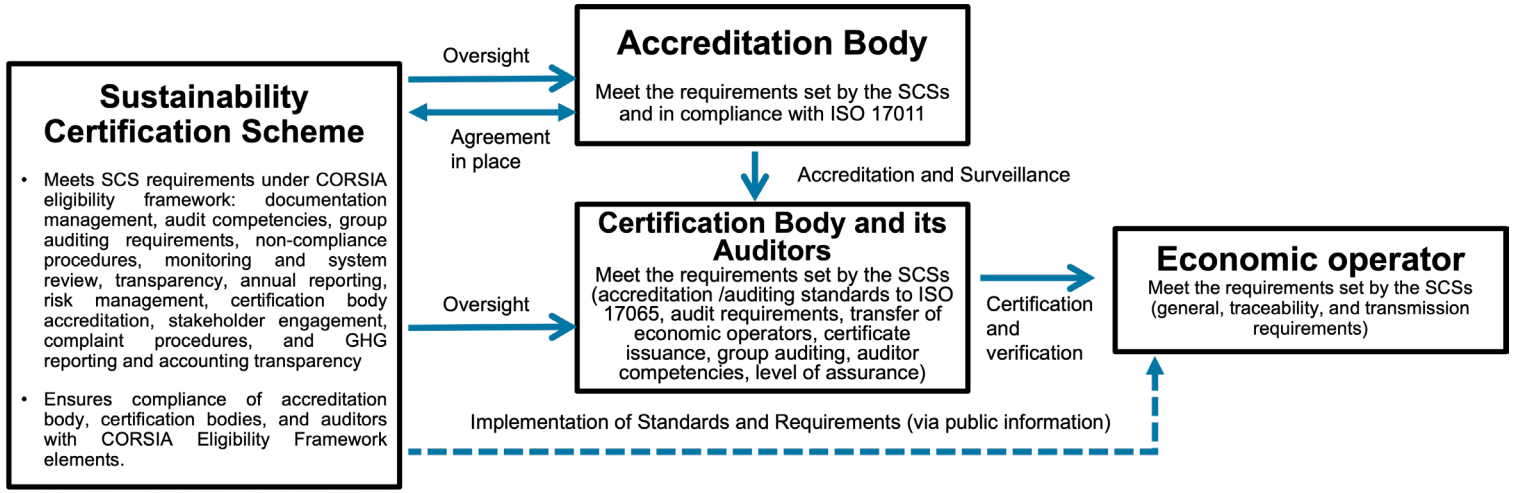

Figure 1: Flowchart of Relation between SCS, Economic Operators, Accreditation Bodies and Certification Bodies. Source: ICAO webpage on CORSIA eligible fuels (link)

- **One of the key advantages of third-party certification over other forms of conformity assessments is independence:**
  - The certification scheme provides a transparent and multi-stakeholder driven auditing framework
  - Separate certification bodies use that auditing framework to conduct conformity assessments of economic operators
- **Next to CORSIA, third-party certification is**
  - required as per other major regulations (e.g. under the EU RED, the UK's RTFO or Japan's FIT scheme) and
  - constitutes best practice in major voluntary markets (e.g., FSC certification for sustainable forestry or GlobalG.A.P. certification for good agricultural practices)

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CORSIA prescribes a stringent set of criteria that SCS must fulfil to become recognized and certify CORSIA eligible fuels

General requirements for SCS

Documentation & Management & Transparency

Annual reports, Monitoring & System Review

Stakeholder Engagement

GHG Reporting & Accounting

Complaint Procedure

Risk Management Plan

Requirements set by SCS for economic operators

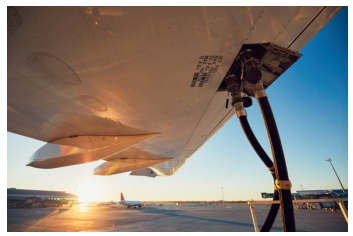
Mass Balance & Supply Chain Traceability

(Group) Audits & Certificate Issuance

Transparency on other SCS used

Assurance Level & handling Non-compliances

Accreditation & Auditing Standards



CORSIA Certification Requirements

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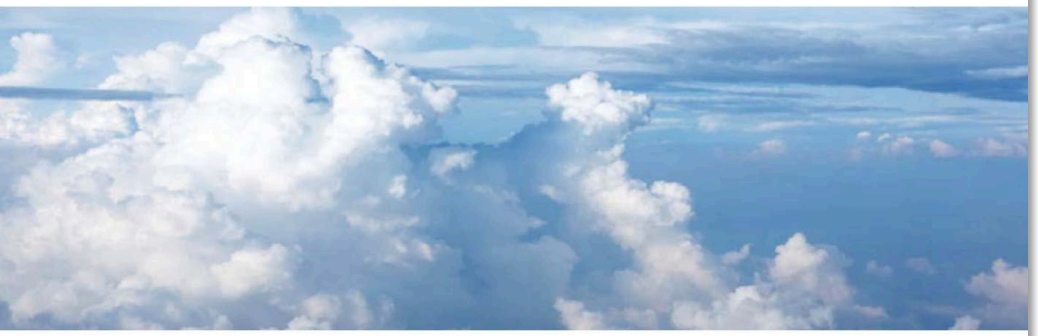
Source: ICAO website: https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx

ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ICAO document

CORSIA Approved Sustainability Certification Schemes



June 2023

CORSIA

Carbon Offsetting and Reduction Scheme for International Aviation

There are currently two SCS approved under CORSIA

Name of the Sustainability Certification Scheme	Date of approval	Website	Scope of approval
International Sustainability and Carbon Certification (ISCC)	16 Jun. 2023	https://www.iscc-system.org/about/sustainable-aviation-fuels/corsia/	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	https://rsb.org/rsb-corsia-certification/	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"

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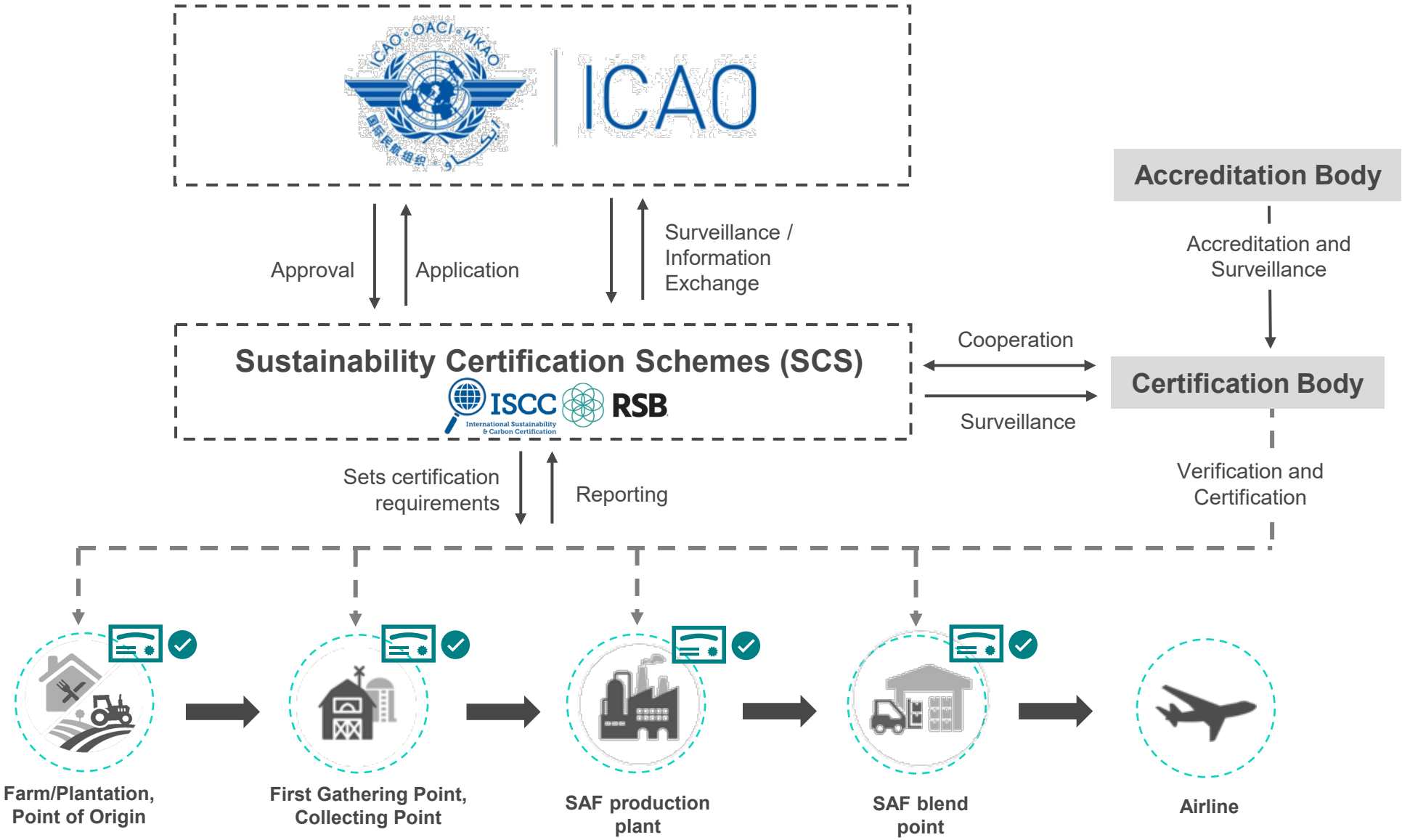
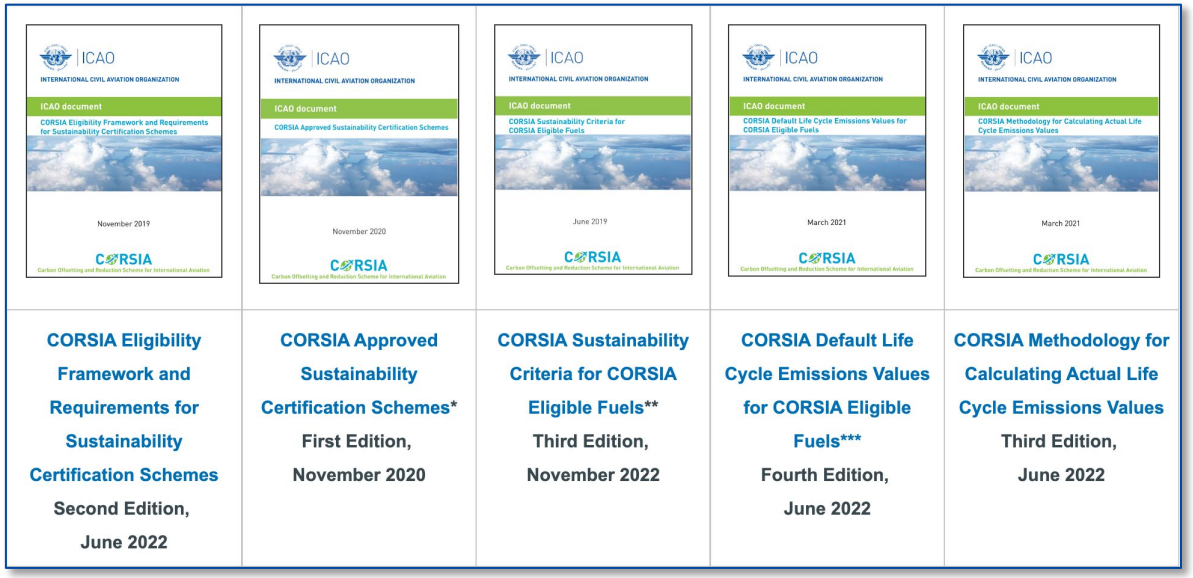
Source: ICAO website: https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx

The certification ‘ecosystem’ for CORSIA eligible fuels



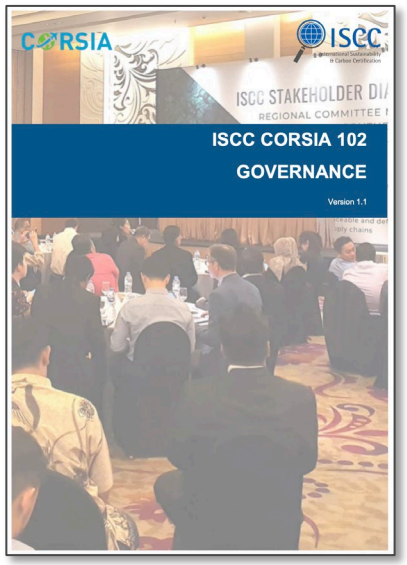
How does certification work? System documents build the basis of SCS' certification standards

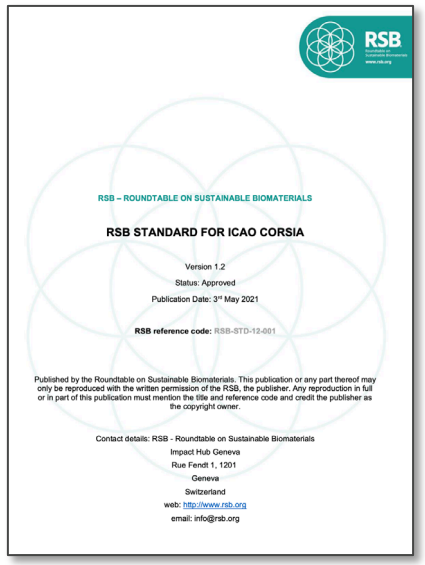
- The System Documents
  - **translate the relevant regulatory requirements** into the scheme's requirements and processes 'on the ground'
  - lay down all relevant **certification requirements and processes** for Certification Bodies and System Users (i.e. certified companies)
  - are **publicly available** on the SCS' websites



CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes Second Edition, June 2022	CORSIA Approved Sustainability Certification Schemes* First Edition, November 2020	CORSIA Sustainability Criteria for CORSIA Eligible Fuels** Third Edition, November 2022	CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels*** Fourth Edition, June 2022	CORSIA Methodology for Calculating Actual Life Cycle Emissions Values Third Edition, June 2022

Example





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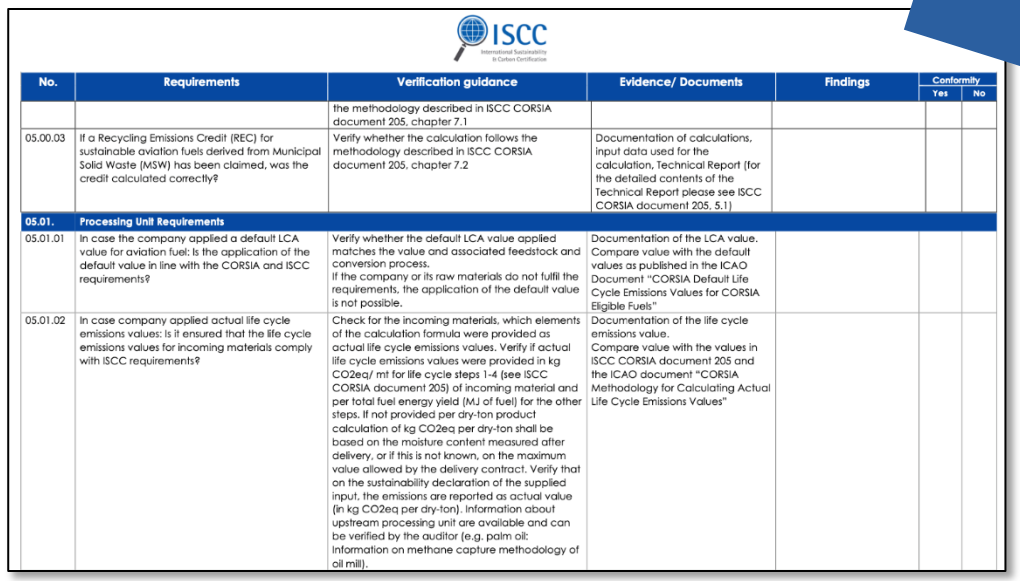
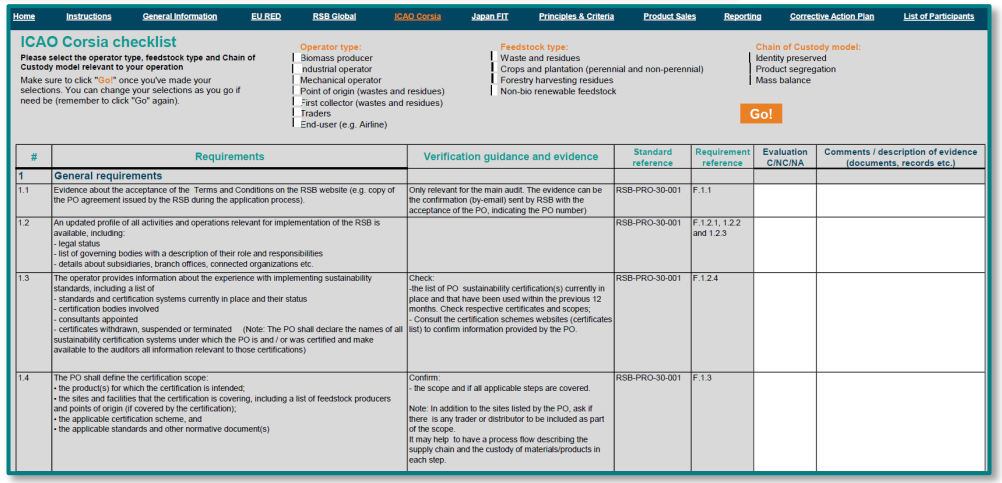
Auditors verify compliance with the standard's requirements via audit checklists. These are based on the system documents

Examples



ISCC

No.	Requirements	Verification guidance	Evidence/ Documents	Findings	Conformity Yes	Conformity No
		the methodology described in ISCC CORSIA document 205, chapter 7.1				
05.00.03	If a Recycling Emissions Credit (REC) for sustainable aviation fuels derived from Municipal Solid Waste (MSW) has been claimed, was the credit calculated correctly?	Verify whether the calculation follows the methodology described in ISCC CORSIA document 205, chapter 7.2	Documentation of calculations, input data used for the calculation, Technical Report (for the detailed contents of the Technical Report please see ISCC CORSIA document 205, 5.1)			
05.01.	**Processing Unit Requirements**					
05.01.01	In case the company applied a default LCA value for aviation fuel: Is the application of the default value in line with the CORSIA and ISCC requirements?	Verify whether the default LCA value applied matches the value and associated feedstock and conversion process. If the company or its raw materials do not fulfil the requirements, the application of the default value is not possible.	Documentation of the LCA value. Compare value with the default values as published in the ICAO Document "CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels"			
05.01.02	In case company applied actual life cycle emissions values: Is it ensured that the life cycle emissions values for incoming materials comply with ISCC requirements?	Check for the incoming materials, which elements of the calculation formula were provided as actual life cycle emissions values. Verify if actual life cycle emissions values were provided in kg CO2eq/ mt for life cycle steps 1-4 (see ISCC CORSIA document 205) of incoming material and per total fuel energy yield (MJ of fuel) for the other steps. If not provided per dry-ton product calculation of kg CO2eq per dry-ton shall be based on the moisture content measured after delivery, or if this is not known, on the maximum value allowed by the delivery contract. Verify that on the sustainability declaration of the supplied input, the emissions are reported as actual value (in kg CO2eq per dry-ton). Information about upstream processing unit are available and can be verified by the auditor (e.g. palm oil: Information on methane capture methodology of oil mill).	Documentation of the life cycle emissions value. Compare value with the values in ISCC CORSIA document 205 and the ICAO document "CORSIA Methodology for Calculating Actual Life Cycle Emissions Values"			



Home | Instructions | General Information | EU RED | RSB Global | ICAO Corsia | Japan FIT | Principles & Criteria | Product Sales | Reporting | Corrective Action Plan | List of Participants

ICAO Corsia checklist

Please select the operator type, feedstock type and Chain of Custody model relevant to your operation

Make sure to click "Go!" once you've made your selections. You can change your selections as you go if need be (remember to click "Go" again).

Operator type: Biomass producer; Industrial operator; Mechanical operator; Point of origin (wastes and residues); First collector (wastes and residues); Traders; End-user (e.g. Airline)

Feedstock type: Waste and residues; Crops and plantation (perennial and non-perennial); Forestry harvesting residues; Non-bio renewable feedstock

Chain of Custody model: Identity preserved; Product segregation; Mass balance

Go!

#	Requirements	Verification guidance and evidence	Standard reference	Requirement reference	Evaluation C/NC/NA	Comments / description of evidence (documents, records etc.)
1	General requirements					
1.1	Evidence about the acceptance of the Terms and Conditions on the RSB website (e.g. copy of the PO agreement issued by the RSB during the application process).	Only relevant for the main audit. The evidence can be the confirmation (by-email) sent by RSB with the acceptance of the PO, indicating the PO number)	RSB-PRO-30-001	F.1.1		
1.2	An updated profile of all activities and operations relevant for implementation of the RSB is available, including: - legal status - list of governing bodies with a description of their role and responsibilities - details about subsidiaries, branch offices, connected organizations etc.		RSB-PRO-30-001	F.1.2.1, 1.2.2 and 1.2.3		
1.3	The operator provides information about the experience with implementing sustainability standards, including a list of - standards and certification systems currently in place and their status - certification bodies involved - consultants appointed - certificates withdrawn, suspended or terminated (Note: The PO shall declare the names of all sustainability certification systems under which the PO is and / or was certified and make available to the auditors all information relevant to those certifications)	Check: -the list of PO sustainability certification(s) currently in place and that have been used within the previous 12 months. Check respective certificates and scopes; - Consult the certification schemes websites (certificates list) to confirm information provided by the PO.	RSB-PRO-30-001	F.1.2.4		
1.4	The PO shall define the certification scope: • the product(s) for which the certification is intended; • the sites and facilities that the certification is covering, including a list of feedstock producers and points of origin (if covered by the certification); • the applicable certification scheme; and • the applicable standards and other normative document(s)	Confirm: - the scope and if all applicable steps are covered. Note: In addition to the sites listed by the PO, ask if there is any trader or distributor to be included as part of the scope. It may help to have a process flow describing the supply chain and the custody of materials/products in each step.	RSB-PRO-30-001	F.1.3		

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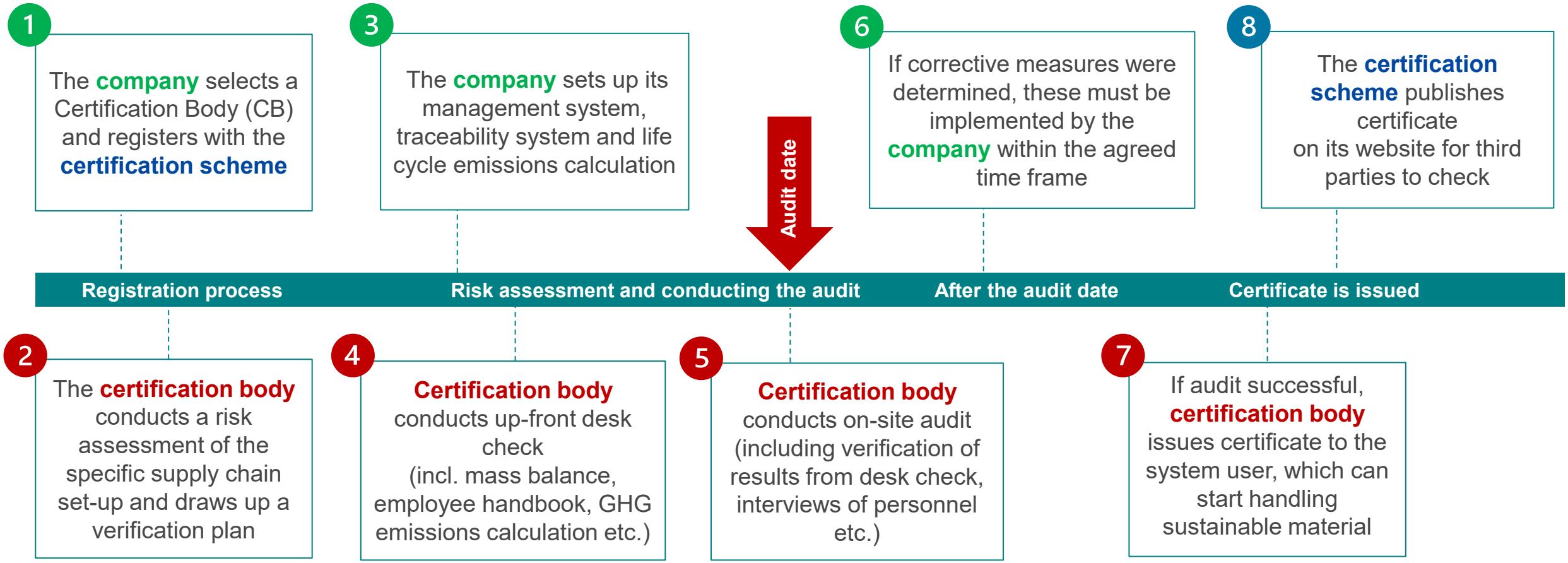
The sustainability certification process. Surveillance or recertification audits generally happen every 12 months. As of today, almost 1,500 companies are certified in the ASEAN region



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Several years ago, ICAO conducted an analysis regarding the costs for economic operators to achieve sustainability certification

- **Sustainability certification costs depend on multiple factors** such as type of raw material, number of on-site audits (sample), company size, complexity of supply chain, certification system used, preparation and awareness
- The sustainability certification **cost estimates for the supply chains analysed are between 0.66 and 1.36 Euro per ton of certified sustainable SAF**. Assuming a market price of 1200 €/t of HEFA, certification costs of UCO-HEFA would be 0.11% of the market value. Certification costs for other SAFs are similar
- The cost estimates are based on RSB and ISCC sustainability requirements (full set of ecological, social sustainability requirements)
- Information available allows the conclusion that **smallholders and small producers** in developing and emerging markets **can be integrated successfully** into the CORSIA sustainability certification schemes, as experience from different markets has shown. Certification would not lead to the exclusion of market participants

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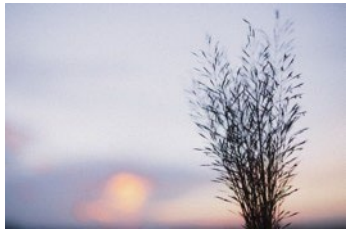
Feedstock certification

SCS cover all types of feedstocks that are eligible for certification under CORSIA

	Examples
Food and feed crops	 Rapeseed
Energy and short-rotation woody crops	 Miscanthus
Agricultural and forestry residues	 Cobs
Wastes	 Used cooking oil
By-products	 Palm fatty acid distillate
Processing residues	 Empty palm fruit bunches
	 Soybean
	 Switchgrass
	 Bark
	 Municipal solid waste
	 Tallow
	 Tall oil

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Palm-based feedstocks can be (and are!) sustainably certified as of today

- Several regulatory frameworks, such as ICAO CORSIA, consider **palm fresh fruit bunches (FFBs) as eligible feedstock**. Many palm plantations are certified as of today
- **Residues from palm processing**, such as palm oil mill effluent (POME) and empty palm fruit bunches (EFB), **are also prominently considered** under different regulatory frameworks. Significant volumes of these residues are certified as of today
- Due to the significant harmonization between different certification systems, **palm producers can become certified to multiple certification systems** during one combined audit. This can help producers **access multiple markets** (renewable fuel markets and non-fuel markets) **at reduced administrative burden and costs**

Sustainable crops must comply with the CORSIA sustainability criteria



Auditor verifies through e.g.

- Remote sensing tools
- Databases (e.g., biodiversity databases)
- On-site inspection
- Interviews with personnel

Sustainable waste/residues must be *genuine* waste/residues


Auditor verifies through e.g.

- Plausibility checks (e.g., amount of input of virgin oil vs amount of used cooking oil)
- On-site inspection
- Checks whether products were intentionally contaminated/modified
- Interviews with personnel

Certain types of land use change for feedstock cultivation are not allowed. In particular, carbon rich areas are protected

Example CORSIA

Carbon Stock

CORSIA eligible fuel should not be made from biomass obtained from land with high carbon stock.

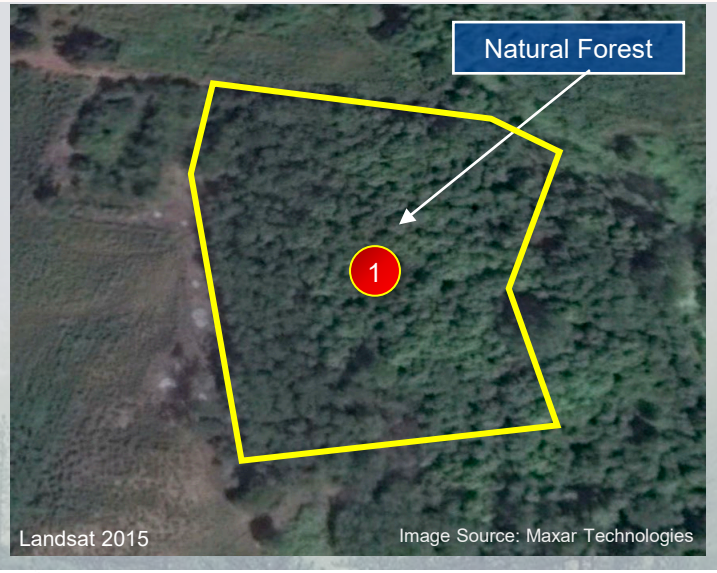
Criterion 1: *CORSIA eligible fuel shall* ***not be made from biomass obtained from land converted after 1 January 2008 that was primary forest, wetlands, or peat lands*** *and/or contributes to* ***degradation of the carbon stock in primary forests, wetlands, or peat lands*** *as these lands all have high carbon stocks.*

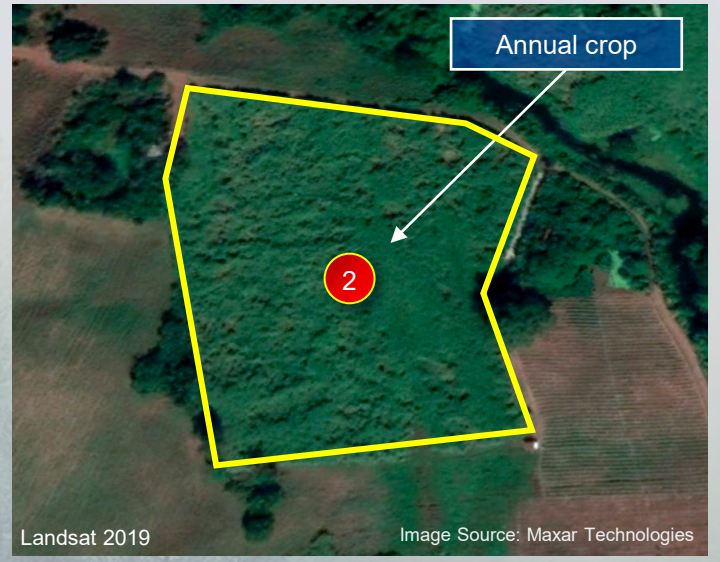
Criterion 2: *In the event of* ***land use conversion after 1 January 2008, as based on IPCC land categories, direct land use change (DLUC) emissions shall be calculated****. If DLUC greenhouse gas emissions exceed the default induced land use change (ILUC) value, the DLUC value shall replace the default ILUC value.**

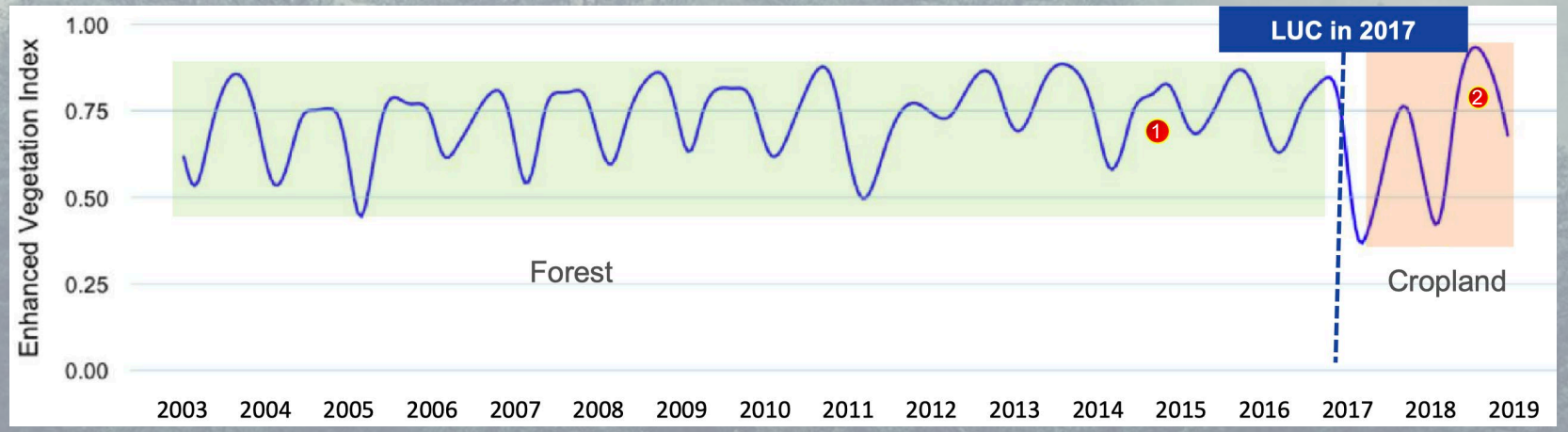
Source: ICAO document (2022) – CORSIA Sustainability Criteria for CORSIA Eligible Fuels.

Example: Identifying land use change (LUC) of carbon rich areas: High resolution satellite images show a conversion from forest to cropland in 2017

Example: Deforestation







Feedstocks with a low risk for land use change can contribute to the feedstock basis for renewable fuels, and are considered by CORSIA

Yield Increase Approach

Where feedstock producers can increase the amount of available feedstock out of a fixed area of land

Unused Land Approach

Where previously unused land is used to cultivate sustainable feedstocks for SAF production

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Feedstocks considered to have a low risk for land use change under CORSIA (if certified accordingly)

Wastes, residues, and by-products (ICAO positive list)

Feedstocks that were produced by utilizing land use change-risk mitigation practices (**land management practices**)

Feedstocks that **do not result in expansion of global agricultural land** use for their production

Feedstocks that **have yields per surface unit significantly higher than terrestrial crops** (i.e., one order of magnitude higher), such as some algal feedstocks

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Certain practices can lead to yield increases at a low risk for LUC. Examples for yield increase measures (subject to certification)

Improvement in agricultural practices

Practices that increase yields through means such as increased organic matter content, reduced soil compaction/erosion, decreased pests, etc.

Intercropping

The combination of two or more crops that grow simultaneously, for example as hedges or through and agroforestry system.

Improvements in post-harvest losses

Losses that occur at cultivation and transport up to but not including first conversion unit in supply chain.

Sequential cropping

The combination of two or more crops that grow at different periods of the year.

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Time for questions

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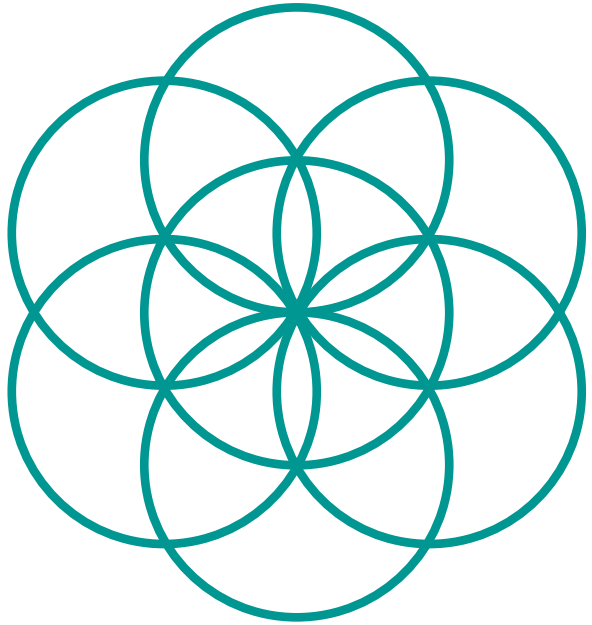


RSB®

Roundtable on
Sustainable Biomaterials

www.rsb.org

Sustainability certification of SAF

28 November 2023

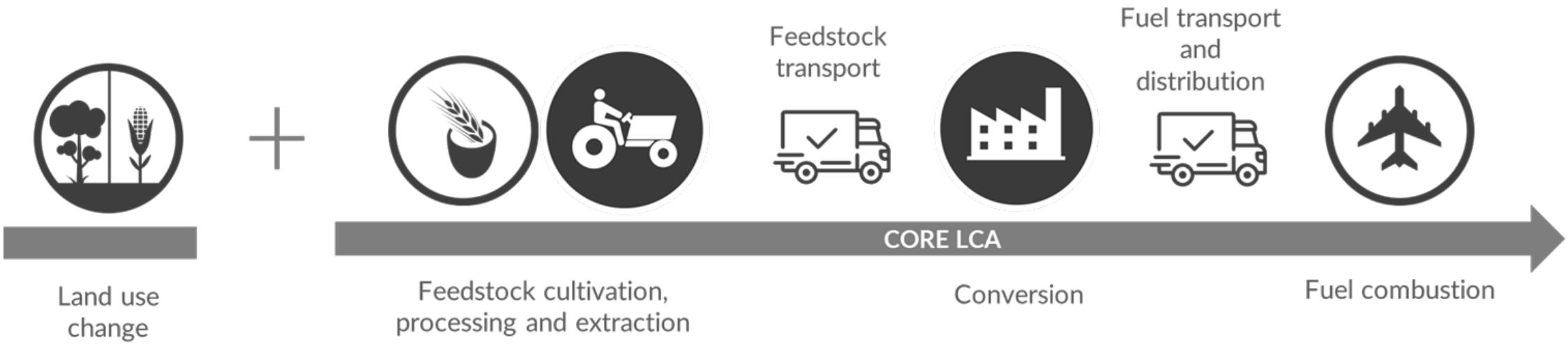
Agenda

1. The sustainability framework for CORSIA eligible fuels
2. The CORSIA sustainability certification process and the role of SCS
3. Feedstock certification
4. CORSIA Life Cycle Emission Methodology
5. Traceability and Chain of Custody
6. Final thoughts

This is a joint presentation by the RSB and the ISCC on the ICAO CORSIA Certification Scheme.

CORSIA Life Cycle Emission Methodology

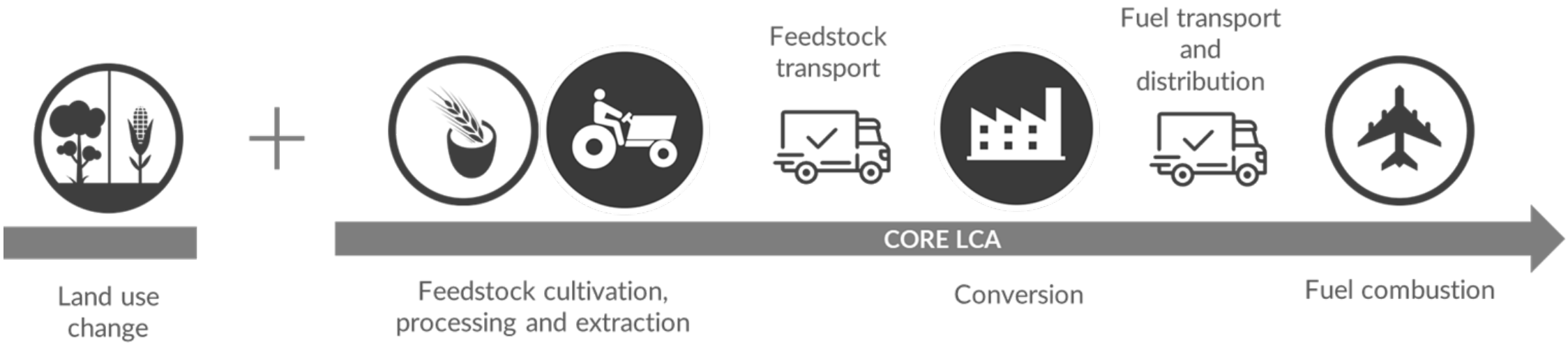
System Boundaries



- ✓ GHG emissions reductions of at least 10% (ILUC + GHG LCA)
- ✓ CORSIA Baseline: 89 g cO2e/MJ (jet fuel) and 95 g cO2e/MJ (AvGas)

ILUC = *Induced* Land Use Change, includes both Direct & Indirect Land Use Change

System Boundaries



- ✓ Core LCA value can be determined either on the basis of default values or calculated actual LCA values.
- ✓ ILUC value must be determined on the basis of default values.
- ✓ DLUC value must be determined on the basis of context specifics, in line with the CORSIA methodology for land use changes.

ILUC = *Induced* Land Use Change, includes both Direct & Indirect Land Use Change

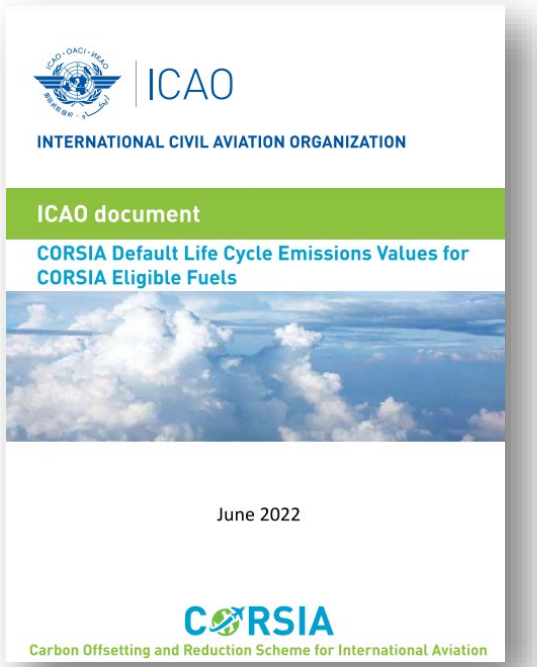
Example

	Option 1	Option 2
GHG LCA	25	45
CORSIA ILUC value	39.1	39.1
Total GHG intensity (GHG LCA+ILUC value)	**64.1**	**84.1**
CORSIA baseline	**89**	**89**
Total saving **GHG LCA only (baseline - GHG LCA)**	64	44
Total saving **GHG LCA + ILUC (baseline - total GHG)**	24.9	4,9
% GHG reductions **GHG LCA only**	**72%**	**49.4%**
% GHG reductions **GHG LCA + ILUC**	**28%**	**5.5%**
CORSIA eligible? >10%		

Values in g CO2 eq / MJ

Default values

- ✓ SAF producer shall use the default values published in the ICAO document entitled “CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels” (available on the ICAO CORSIA website and in the Annex I of the RSB ICAO CORSIA Standard);



Source: CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels - June 2022

Default values

Table 4. CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels produced with the Alcohol (ethanol) to jet (ETJ) Fuel Conversion Process

Region	Fuel Feedstock	Pathway Specifications	Core LCA Value	ILUC LCA Value	LS_f (gCO_2e/MJ)
Brazil	Sugarcane	Integrated conversion design	24.1	8.7	32.8
Global	Sugarcane	Integrated conversion design	24.1	8.5	32.6
USA	Corn grain	Standalone or integrated conversion design	65.7	25.1	90.8
Global	Corn grain	Standalone or integrated conversion design			
Global	Agricultural residues	Standalone conversion design Residue removal does not necessitate additional nutrient replacement on the primary crop.			
Global	Agricultural residues	Integrated conversion design Residue removal does not necessitate additional nutrient replacement on the primary crop.			
Global	Forestry residues	Standalone conversion design			
Global	Forestry residues	Integrated conversion design			
USA	Miscanthus (herbaceous energy crops)	Standalone conversion design			
EU	Miscanthus (herbaceous energy crops)	Standalone conversion design			
Global	Miscanthus (herbaceous energy crops)	Standalone conversion design			
USA	Miscanthus (herbaceous energy crops)	Integrated conversion design			
EU	Miscanthus (herbaceous energy crops)	Integrated conversion design			
Global	Miscanthus (herbaceous energy crops)	Integrated conversion design			
USA	Switchgrass (herbaceous energy crops)	Standalone conversion design			
Global	Switchgrass (herbaceous energy crops)	Standalone conversion design			
USA	Switchgrass (herbaceous energy crops)	Integrated conversion design			
Global	Switchgrass (herbaceous energy crops)	Integrated conversion design			
Global	Waste gases	Ethanol produced via microbiologic conversion route Standalone conversion design	42.4	0	42.4
Global	Waste gases	Ethanol produced via microbiologic conversion route	29.4	0	29.4

Table 1. CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels produced with the Fischer-Tropsch Fuel Conversion Process

Region	Fuel Feedstock	Pathway Specifications	Core LCA Value	ILUC LCA Value	LS_f (gCO_2e/MJ)
Global	Agricultural residues	Residue removal does not necessitate additional nutrient replacement on the primary crop	7.7	0.0	7.7
Global	Forestry residues		8.3		8.3
Global	Municipal solid waste (MSW), 0% non-biogenic carbon (NBC)		5.2		5.2
Global	Municipal solid waste (MSW) (NBC given as a percentage of the non-biogenic carbon content)		NBC*170.5 + 5.2		NBC*170.5 + 5.2
USA	Poplar (short-rotation woody crops)		12.2	-5.2	7.0
Global	Poplar (short-rotation woody crops)		12.2	8.6	20.8
USA	Miscanthus (herbaceous energy crops)		10.4	-32.9	-22.5
EU	Miscanthus (herbaceous energy crops)		10.4	-22.0	-11.6
Global	Miscanthus (herbaceous energy crops)		10.4	-12.6	-2.2

Table 2. CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels produced with the Hydroprocessed Esters and Fatty Acids (HEFA) Fuel Conversion Process

Region	Fuel Feedstock	Pathway Specifications	Core LCA Value	ILUC LCA Value	LS_f (gCO_2e/MJ)
Global	Tallow		22.5	0.0	22.5
Global	Used cooking oil		13.9		13.9
Global	Palm fatty acid distillate		20.7		20.7
		Oil from dry mill ethanol plant	17.2		17.2
			40.4	24.5	64.9
			40.4	27.0	67.4
			40.4	25.8	66.2
			47.4	24.1	71.5
			47.4	26.0	73.4
		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	39.1	76.5
		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	39.1	99.1
		Feedstock is grown as a secondary crop that avoids other crops displacement	34.4	-20.4	14.0
		Feedstock is grown as a secondary crop that avoids other crops displacement	34.4	-21.4	13.0
		Feedstock is grown as a secondary crop that avoids other crops displacement	34.4	-12.7	21.7
Global	Camelina oil	Feedstock is grown as a secondary crop that avoids other crops displacement	42.0	-13.4	28.6
India	Jatropha oil	Meal used as fertilizer or electricity input	46.9	-24.8	22.1
India	Jatropha oil	Meal used as animal feed after detoxification	46.8	-48.1	-1.3

Source: CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels - June 2022

Default values

- ✓ SAF producer shall use the default values published in the ICAO document entitled “CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels” (available on the ICAO CORSIA website and in the Annex I of the RSB ICAO CORSIA Standard);

- ✓ SAF producer shall only use the default life cycle emission values if the fuel supply chain matches with the information given in the table for the fuel conversion process;

REGION

TYPE OF FEEDSTOCK

PATHWAY SPECIFICATION

Actual values

- ✓ The operator shall ensure that the system used to calculate GHG emissions for actual LCA values follows the CORSIA LCA methodology.

- ✓ The calculation shall include emissions from:
  - ✓ ongoing operational activities
  - ✓ material and utility inputs
    - ✓ **Emissions generated during one-time construction or manufacturing activities (e.g. fuel production facility construction, equipment manufacturing) shall not be included.*

- ✓ Energy-based allocation - emissions burdens are allocated to co-products in proportion to their contribution to the total energy content of all the outputs.

Feedstock types

- ✓ Different approaches are taken for calculating the core LCA emissions according to the type of feedstock.

Primary and co-products: main products of a production process. These products have significant economic value and elastic supply.

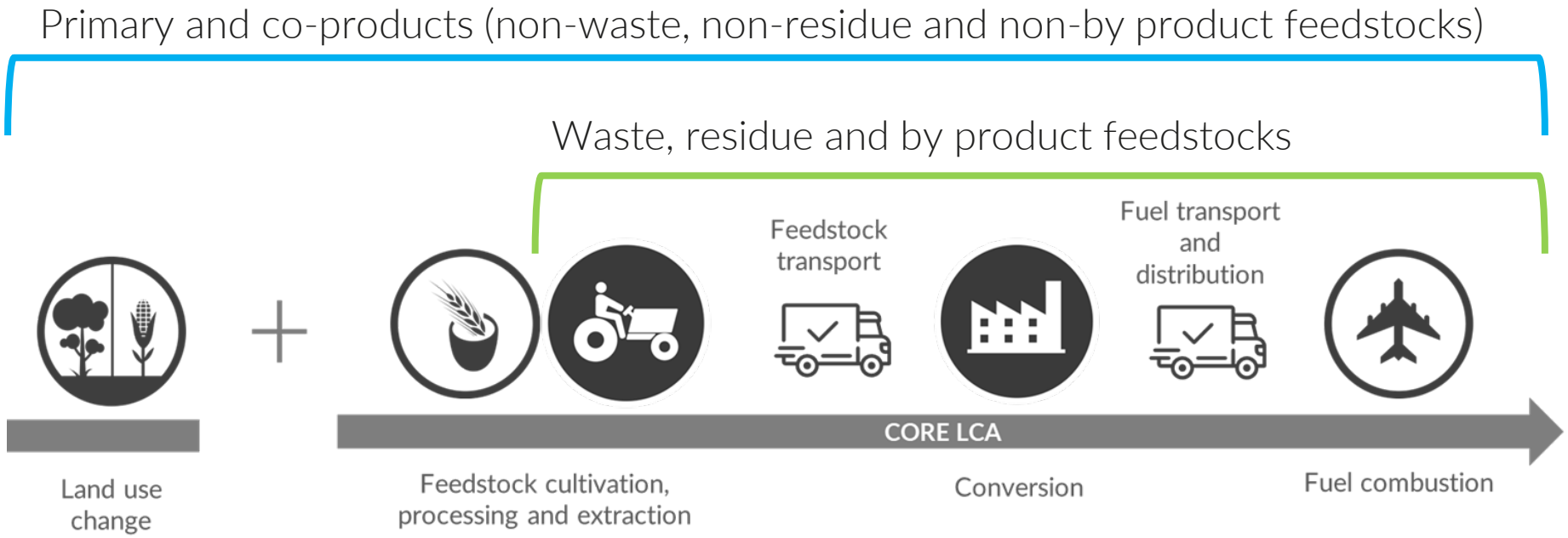
By-products: secondary products with inelastic supply and economic value (e.g. tallow).

Residues: are secondary materials with inelastic supply and little economic value (e.g. bagasse).

Waste: materials with inelastic supply and no economic value. A substance that will be discarded or required to be discarded (e.g. UCO).

Feedstock types

- ✓ Different approaches are taken for calculating the core LCA emissions according to the type of feedstock.

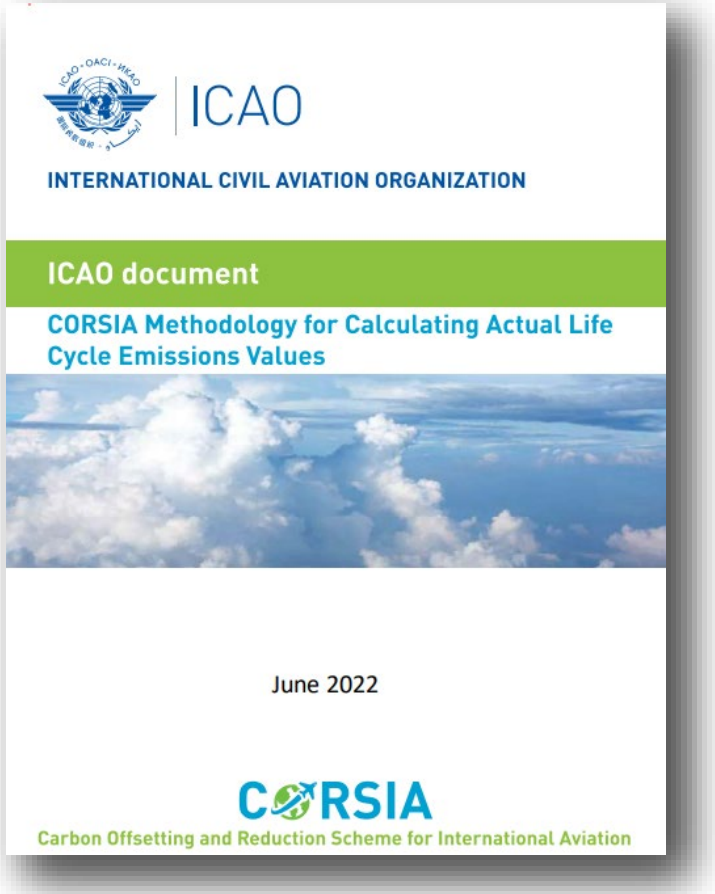


- ✓ No emissions shall be allocated to wastes, residues and by-products.

Low ILUC Risk Feedstock

- ✓ Feedstocks that are "low risk" for ILUC shall be assigned an ILUC value of zero.
- ✓ Feedstocks classified as a waste, residue, or by-product shall be assigned an ILUC value of zero.
- ✓ Positive list (not exhaustive) of feedstocks that are classified as by-product, waste or residues.
- ✓ A default ILUC value for primary and co-products feedstocks must be added to the ICAO document titled "*CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels*" before the fuel is eligible under CORSIA.

Positive list: By-products, Wastes and Residues

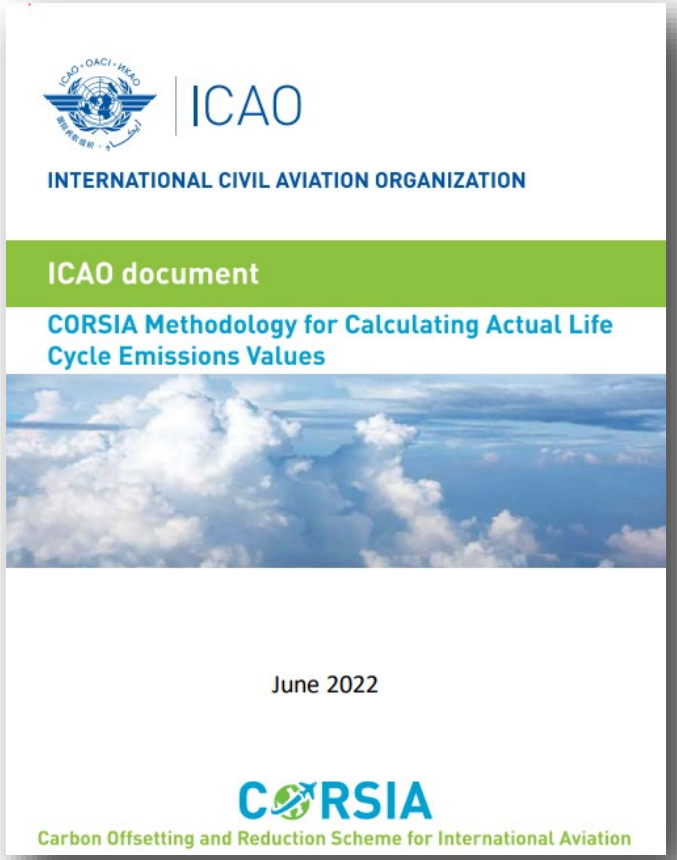


Source: CORSIA Methodology For Calculating Actual Life Cycle Emissions Values - June 2022

Table 1. Positive list of materials classified as co-products, residues, wastes or by-products

Residues	Wastes	By-products	Co-products
Agricultural residues:	Municipal solid waste	Palm Fatty Acid Distillate	Molasses
Bagasse	Used cooking oil	Tallow	-
Cobs	Waste gases	Technical corn oil	
Stover			
Husks			
Manure			
Nut shells			
Stalks			
Straw			
Forestry residues:			
Bark			
Branches			
Cutter shavings			
Leaves			
Needles			
Pre- commercial thinnings			
Slash			
Tree tops			
Processing residues:			
Crude glycerine			
Forestry processing residues			
Empty palm fruit bunches			
Palm oil mill effluent			
Sewage sludge			
Crude Tall Oil			
Tall oil pitch			

Positive list: By-products, Wastes and Residues



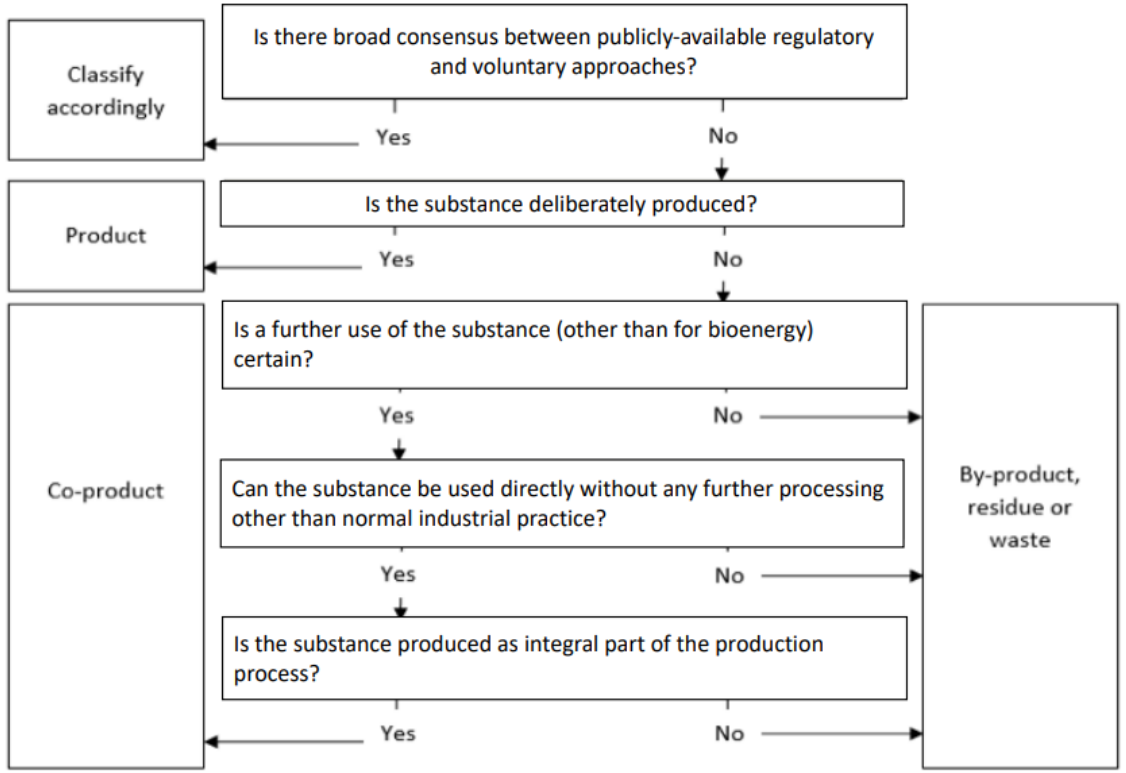


Figure 1. Guidance for inclusion of additional materials in positive list

Source: CORSIA Methodology For Calculating Actual Life Cycle Emissions Values - June 2022

Traceability and Chain of Custody

Definitions

✓ Chain of Custody definition:

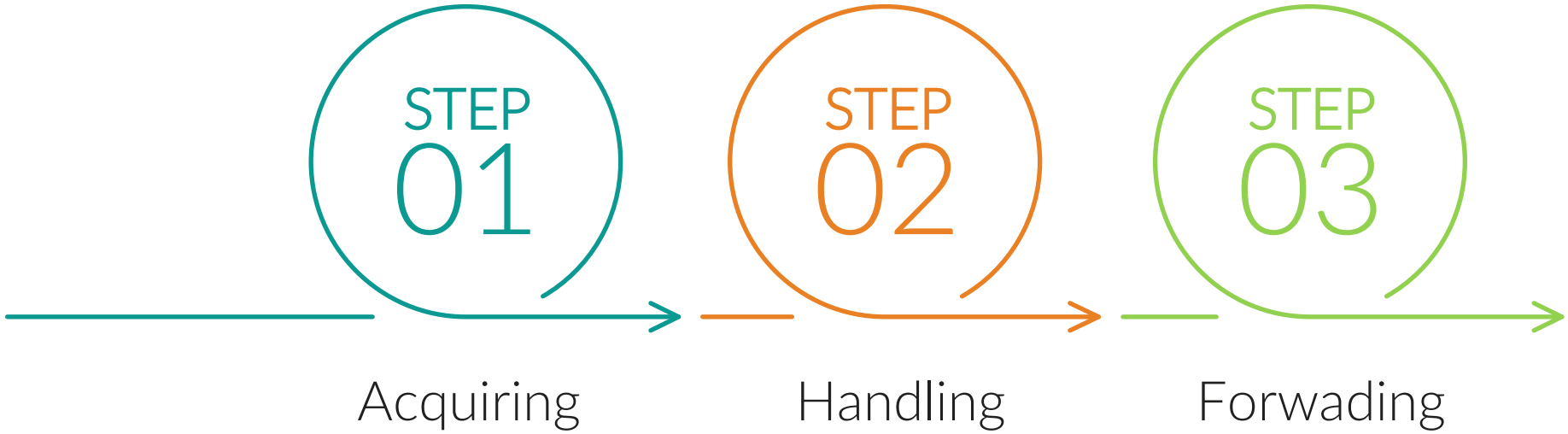
Process by which inputs and outputs and associated information are transferred, monitored and controlled as they move through each step in the relevant supply chain (Source: ISO/DIS 22095).

✓ Chain of Custody system:

Set of measures designed to implement a Chain of Custody, including documentation of these measures (Source: ISO/DIS 22095).

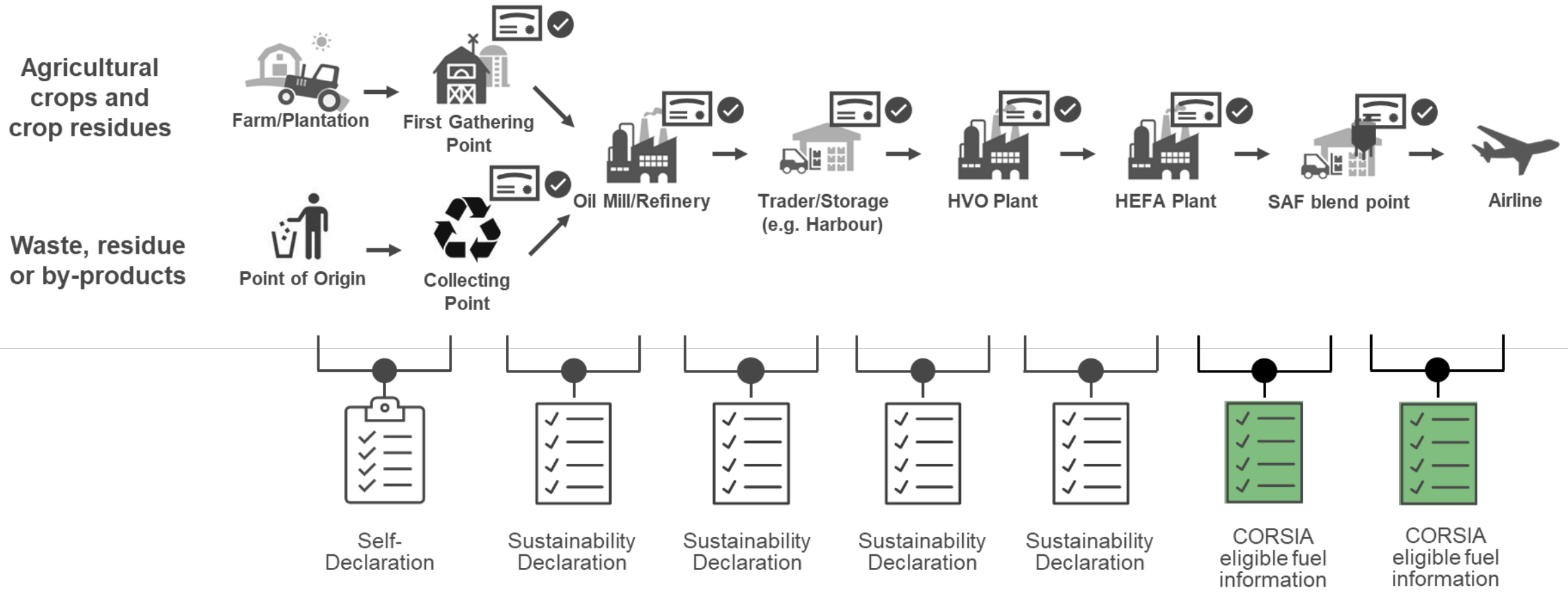
Definitions

Three steps for tracking materials:



Flow of sustainability information

Sustainability information (e.g., on GHG emissions) is forwarded through the supply chain step-by-step.



Models of Chain of Custody

Models and definitions:

Identity Preserved (IP)	Certified product delivered is uniquely identifiable and can be related to the identity of producer and resource base.
Product Segregation	The information on sustainability remains traceable to the physical product.
Mass Balance	The information on sustainability can be traced to a specific production quantity.
Book & Claim	Sustainability claim made by a company is separated from the physical flow of these goods.

Mass Balance

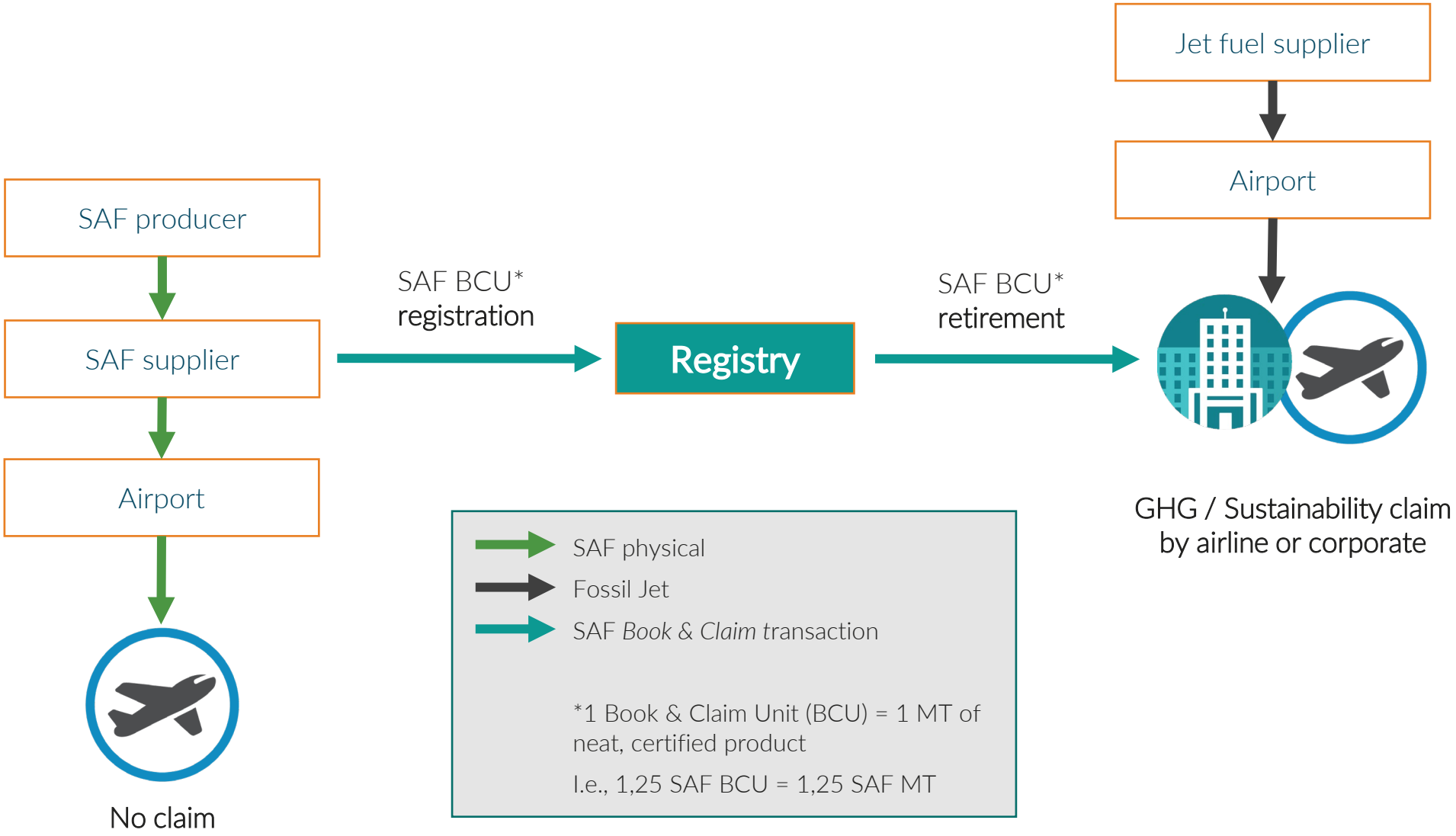
What is a Mass Balance Chain of Custody?

- An **accounting system** that shows the balance of inputs and outputs of certified material from a particular storage or production site (eg: a warehouse, a biodiesel production plant).
- It works like a "bank account", with credit and debit; the quantity of certified product received and sold by each site shall be measured and recorded.
- It does not require physical segregation allows mixtures between certified and non-certified material.

Requirements:

- **Each site** has to calculate **its own mass balance**
- Apply either a continuous or a fixed mass balance accounting:
  - Continuous: no deficits allowed
  - Fixed: 3 moths balancing period (maximum)
- A positive balance of certified material may be reported into the next reporting period if the corresponding amount of material is in stock and until your positive balance is expended.

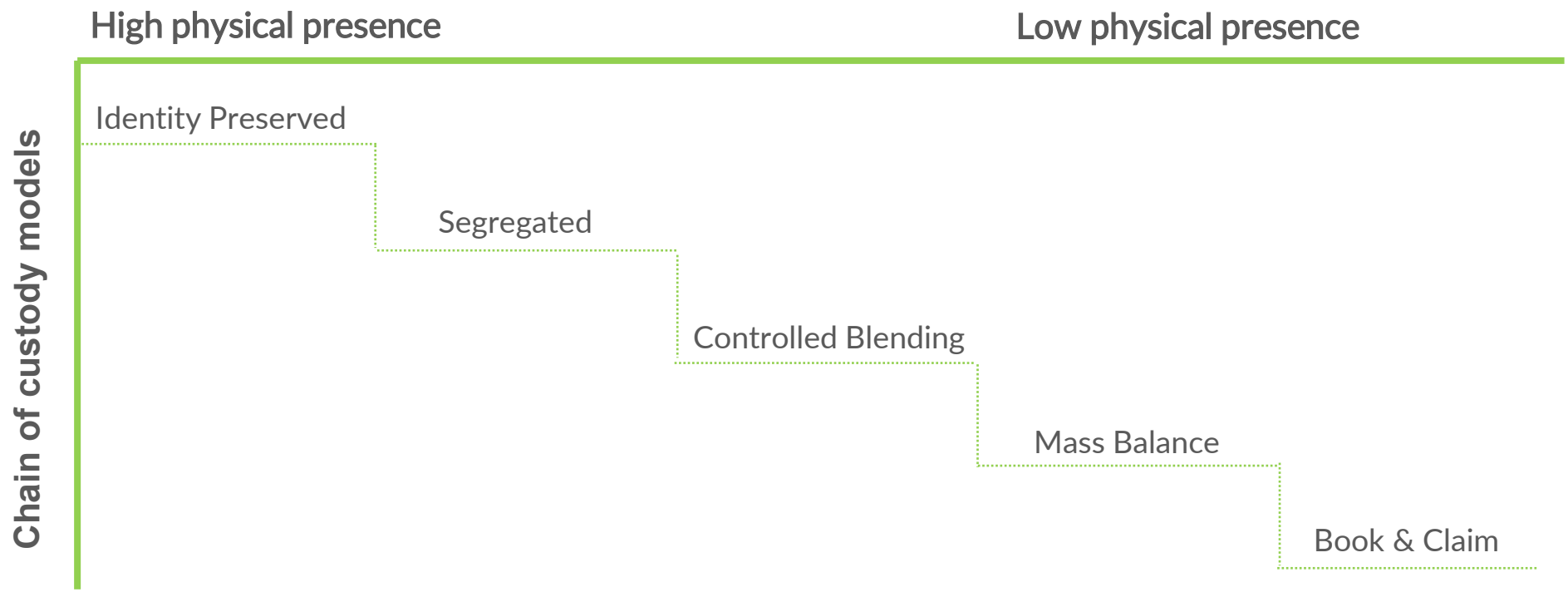
Book and Claim



Models of Chain of Custody

Models and definitions:

Chain of custody models ranked according to the physical presence of specified characteristics
Source: IS*O/DIS 22095:2019(E): Chain of Custody – General terminology and models*



Questions and discussion