

# An Overview of CORSIA Eligible Fuels (CEF)

By ICAO Secretariat

As explained in Chapters 4 and 5, the development and deployment of sustainable aviation fuels (SAF) is one element of the ICAO basket of measures to reduce aviation emissions. As a consequence, ICAO is pursuing several initiatives to support the further development and deployment of SAF.

Specifically on CORSIA, the ICAO Assembly Resolution A39-3 requested the development of a methodology “to ensure that an aircraft operator’s offsetting requirements under the scheme [CORSIA] in a given year can be reduced through the use of sustainable alternative fuels, so that all elements of the basket of measures are reflected” (Resolution A39-3, paragraph 6).

In line with this Assembly request, Annex 16, Volume IV defines a “CORSIA eligible fuel” (CEF) as a “CORSIA sustainable aviation fuel” or a “CORSIA lower carbon aviation fuel”, which an operator may use to reduce their offsetting requirements. This article presents the specific procedures and methodologies that will allow operators to claim emissions reductions from the use of CORSIA eligible fuels, as well as details on how such processes were developed by CAEP.

## CORSIA DEFINITIONS

Historically, terms such as “alternative fuels” or “sustainable fuels” have been used in many instances to designate fuels produced from non-conventional processes and, consequently, lower environmental impact. In the context of CORSIA, Annex 16, Volume IV includes the following definitions related to fuels:

*CORSIA eligible fuel.* A CORSIA sustainable aviation fuel or a CORSIA lower carbon aviation fuel, which an operator may use to reduce their offsetting requirements.

*CORSIA lower carbon aviation fuel.* A fossil-based aviation fuel that meets the CORSIA Sustainability Criteria under this Volume.

*CORSIA sustainable aviation fuel.* A renewable or waste-derived aviation fuel that meets the CORSIA Sustainability Criteria under this Volume.

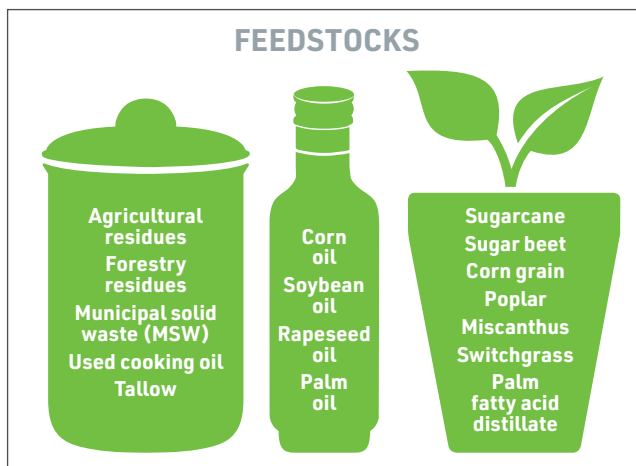
## HOW DOES A FUEL BECOME A CORSIA ELIGIBLE FUEL (CEF)?

In order to understand how a fuel becomes a CORSIA eligible fuel, this section will provide an overview of the fuel supply chain – from the feedstock, to the conversion process, to the sustainability certification process, and finally its consideration as a CORSIA eligible fuel.

## FEEDSTOCK

Several feedstock types have the potential to produce a CORSIA eligible fuel (CEF). As of February 2019, CAEP has developed default life cycle emission values for CORSIA sustainable aviation fuels produced from sixteen distinct feedstocks, as provided in Figure 1. Work is ongoing in CAEP to develop specific methodologies for the consideration of CORSIA lower carbon aviation fuels. More feedstock types may become available to fuel producers as the CEF industry evolves.

**FIGURE 1:** Feedstocks with CORSIA Default Life Cycle Emission Values (February 2019)



## FUEL CONVERSION

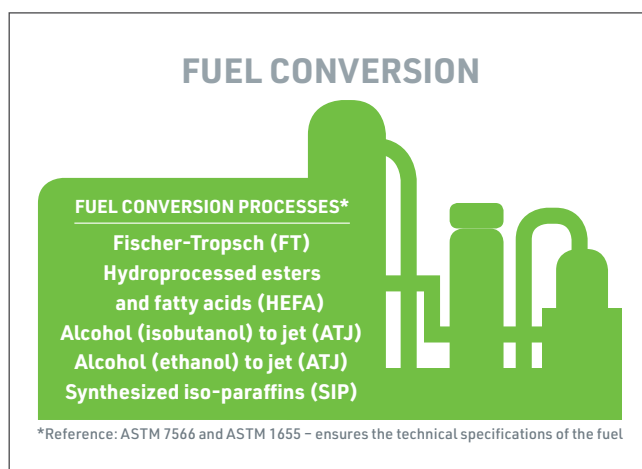
The identified feedstock types are converted into aviation fuel through a fuel conversion process. The international standard-setting organization, ASTM International, has certified six fuel conversion processes for use in aircraft, as listed below (ASTM 7566 and ASTM 1655). This certification relates to the technical specifications of the fuel and ensures that the product is safe for use in an aircraft, by meeting the same safety standards as any other jet fuel.

## SUSTAINABILITY CERTIFICATION

Beyond the technical certification process described above, fuels must also go through a sustainability certification process if they are to be used in CORSIA. Following the request of the ICAO Assembly, CAEP developed a sustainability certification process based on existing sustainability approaches, whether regulatory or voluntary, for the sustainability demonstration of aviation fuels.

Many aviation fuels already go through a voluntary or regulatory sustainability certification process, but the method described below refers to the CORSIA-specific process recommended by CAEP.

**FIGURE 2:** Fuel Conversion Processes Approved by ASTM International



**FIGURE 3:** Sustainability Certification



## LIFE CYCLE EMISSION VALUE (LSf)

The use of CEF can reduce aviation CO<sub>2</sub> emissions on a life cycle basis (i.e., from production to combustion). The reduction of CO<sub>2</sub> emissions from CEF depends on a variety of factors, for example, the feedstock used, how the feedstock was produced, the fuel conversion process used, etc. These factors combine to provide a fuel's life cycle emissions value (LSf).

## CORSIA IMPLEMENTATION ELEMENT FOR CEF

The procedures and requirements for a CEF to be considered under CORSIA are defined within five ICAO documents, which are referenced in Annex 16, Volume IV. These documents form the CORSIA Implementation Element for CEF. They are:

1. CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes (SCS)  
This ICAO document defines the requirements that SCS need to comply with, in order to be approved by ICAO to perform the sustainability certification of CORSIA eligible fuels, as well as to assess the life cycle emission value (LSf) of CEFs.

2. CORSIA Approved Sustainability Certification Schemes  
This ICAO document will include the list of SCSs approved by the ICAO Council, in accordance with the Framework and Requirements laid out in ICAO document (1).

3. CORSIA Sustainability Criteria for CORSIA Eligible Fuels  
This ICAO document presents the Sustainability Criteria that needs to be observed by a given fuel. The first edition of the document, which applies until December 31st, 2023 (end of the CORSIA pilot phase), can be accessed from the ICAO CORSIA webpage<sup>1</sup>.

4. CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels

This ICAO document provides a list of Default Life Cycle Emissions Values for CEFs, as a function of the feedstock, conversion process, and production region. This is the simplest option available to determine the LSf value of a given CEF.

The CORSIA supporting document “CORSIA Eligible Fuels – Life Cycle Assessment Methodology” (available from the ICAO CORSIA webpage<sup>2</sup>) provides technical information and describe ICAO processes to manage and maintain this ICAO document.

5. CORSIA Methodology for Calculating Actual Life Cycle Emissions Values

This ICAO document provides methodologies that can be used by fuel producers to calculate Actual Life Cycle Emissions Values. These methodologies allow fuel producers to claim Life Cycle Emissions Values lower than the default values in ICAO document (4), in case they can support that with proper technical information.

Each of these documents will be made available on the ICAO website, as they are approved by the ICAO Council.

## SUSTAINABILITY CERTIFICATION SCHEMES

Sustainability Certification Schemes (SCSs) will ensure that a CEF meets the CORSIA Sustainability Criteria (3), and will ensure that the Life Cycle Emission Value of the CEF is obtained correctly (4 and 5). SCSs must be approved by the ICAO Council to perform this sustainability certification process (1), (2).

1 <https://www.icao.int/environmental-protection/CORSIA/Documents/ICA0%20document%2005%20-%20Sustainability%20Criteria.pdf>

2 [https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Supporting%20Document\\_CORSIA%20Eligible%20Fuels\\_LCA%20Methodology.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Supporting%20Document_CORSIA%20Eligible%20Fuels_LCA%20Methodology.pdf)

## USING CEF IN CORSIA

An aeroplane operator can reduce its CORSIA offsetting requirements by claiming emissions reductions from the use of CEF through the following process:

1. The operator obtains the life cycle emissions value (LSf) of the CEF. This is determined during the CEF sustainability certification process, as described above.
2. The operator calculates the CEF emissions reductions (ER<sub>y</sub>) as follows:

## CONCLUSION

The processes described in this article ensure that an aircraft operator's offsetting requirements under CORSIA can be reduced through the use of CEF. Through CAEP work, ICAO has coordinated with fuel producers, sustainability certification schemes, airlines, States, and additional stakeholders to ensure that the process for using CEF in CORSIA is feasible, while ensuring the environmental integrity of the scheme. As the CEF industry progresses, ICAO will continue to work with these stakeholders towards the achievement of ICAO's aspirational goals.

**FIGURE 4:** CEF Emissions Reductions Formula

*Fuel Conversion Factor, fixed value,  
3.16 for Jet-A/ Jet-A1 or 3.10 for AvGas/ Jet B  
[kg CO<sub>2</sub>/kg fuel]*

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

*Total mass of CEF claimed  
in the year y, by fuel type f [tonnes]*

*Baseline life cycle emissions,  
fixed value, 89 for jet fuel or  
95 for AvGas [gCO<sub>2e</sub>/MJ]*

Example: If, in 2021, an operator uses 10,000 tonnes of Jet-A fuel produced from Used Cooking Oil (default **LSf=13.9 gCO<sub>2e</sub>/MJ\***), the amount of emissions reductions will be:

$$ER_{2021} = 3.16 \times \left[ 10,000 \times \left( 1 - \frac{13.9}{89} \right) \right] = \mathbf{26,665 \text{ tonnes of CO}_2}$$

3. The operator includes information on CEF in its Emissions Report, including:
  - CEF emissions reductions (ER<sub>y</sub>) claimed
  - Fuel type, mass, and life cycle emissions value (LSf)
  - Evidence of compliance with CORSIA sustainability criteria
4. A verification body verifies information on CEF provided in the Emissions Report. (More information on verification is available throughout this chapter.)
5. The State collects and aggregates verified information on CEF from all aeroplane operators attributed to it, and reports aggregated information to ICAO through the CORSIA Central Registry (CCR).