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CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels

November 2025

CORSIA

Carbon Offsetting and Reduction Scheme for International Aviation

This ICAO document is referenced in Annex 16 — *Environmental Protection*, Volume IV — *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*. This ICAO document is material approved by the ICAO Council for publication by ICAO to support Annex 16, Volume IV and is essential for the implementation of the CORSIA. This ICAO document is available on the ICAO CORSIA website and may only be amended by the Council.

Table A shows the origin of amendments to this ICAO document over time, together with a list of the principal subjects involved and the dates on which the amendments were approved by the Council.

Table A. Amendments to the ICAO document "CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels"

Amendment	*Source(s)*	*Subject(s)*	*Approved*
1st Edition	Eleventh meeting of the Committee on Aviation Environmental Protection	First edition of the document.	25 Nov 2019
2nd Edition	2020 Steering Group meeting of the Committee on Aviation Environmental Protection	a) new default LCA values for CORSIA Sustainable Aviation Fuels (SAFs) produced with new pathways (HEFA Brassica Carinata, and ETJ agricultural residues, forestry residues, Miscanthus, and Switchgrass); and b) editorial amendments that clarify the purpose of the ICAO document.	12 March 2021
3rd Edition	2021 Steering Group meeting of the Committee on Aviation Environmental Protection	a) new default emission values for SAF produced from waste gases (ETJ conversion process) b) new default emission values for SAF from tallow, soybean oil, and used cooking oil co-processed at petroleum refineries; c) specifications for various pathways (agricultural residues-FT and ATJ; corn oil HEFA; palm oil HEFA; corn grain / sugarcane ATJ and ETJ; forestry residues / miscanthus / switchgrass ETJ); d) editorial amendments to improve readability of the document	10 November 2021
4th Edition	Twelfth meeting of the Committee on Aviation Environmental Protection	a) inclusion of global ILUC values for various pathways b) new default emission values for SAF produced from molasses (ATJ conversion process) c) new default values for SAF produced from jatropha (HEFA conversion process) d) inclusion of guidance for the calculation of life cycle emissions of co-processed fuels	3 June 2022
5th Edition	2023 Steering Group meeting of the Committee on Aviation Environmental Protection	a) Removal of the limitation of use of negative ILUC values on the CORSIA Pilot phase only, b) Consequential amendments from the adoption of the second edition of Annex 16, Vol IV. c) Inclusion of clarifications regarding oilseeds and plastic waste feedstocks.	11 March 2024

Amendment	*Source(s)*	*Subject(s)*	*Approved*
6th Edition	2024 Steering Group meeting of the Committee on Aviation Environmental Protection	a) Inclusion of default core LCA values for beef tallow, poultry fat, lard fat, and mixed animal fats b) Inclusion of applicability provisions for the default core LCA value for tallow. c) General restructuring of the document, for inclusion of specific applicability language d) Clarification on the life cycle emissions for co-processed fuels for compliance with Sustainability Criteria 1.1 e) Inclusion of default core LCA value for non-standard coconuts f) Inclusion of pathway specifications for ILUC values associated with cellulosic feedstocks (poplar, miscanthus, and switchgrass)	28 October 2024
7th Edition	Thirteenth meeting of the Committee on Aviation Environmental Protection	a) Updated default ILUC values for all pathways, considering the following updates on the ILUC models: 1) use of updated IPCC2019 factors on land use change; (2) adjusting ILUC values to remove Soil Carbon Accumulation effects due to land management practices; and (3) updates in the ATJ-ethanol energy conversion yields b) Updated default core LCA values for ATJ-Ethanol standalone pathways c) Inclusion of correction factors related to hydrogen and heat production methods, and international transportation of feedstock d) Inclusion of equations defining the production of co-processed SAF on facilities certified for LCAF production e) Clarification on the use of ILUC values from different world regions f) Inclusion of default ILUC values for Brazil corn grain ATJ pathways (ethanol and isobutanol)	27 June 2025
8th Edition	CAEP Conference Call (Nov 4, 2025)	a) Inclusion of default core LCA value for the Palm Oil Mill Effluent (POME) HEFA pathway	19 November 2025

CORSIA DEFAULT LIFE CYCLE EMISSIONS VALUES FOR CORSIA ELIGIBLE FUELS

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1 ACRONYMS

ATJ	Alcohol-to-jet
CO_2e	Carbon dioxide equivalent
FT	Fischer-Tropsch
HEFA	Hydroprocessed esters and fatty acids
ILUC	Induced land use change
LCA	Life cycle assessment
L_{CEF}	Life cycle emissions value for a CORSIA Eligible fuel in gCO_2e/MJ
MSW	Municipal Solid Waste
NBC	Non-biogenic carbon
POME	Palm Oil Mill Effluent
SIP	Synthetic iso-paraffin

2 DEFINITIONS

Standalone conversion design – pathway utilizes a facility to produce fuel from an intermediate product (e.g., ethanol/isobutanol) that is not co-located with the facility that produces the intermediate product from the fuel feedstock.

Integrated conversion design - pathway utilizes a co-located facility where heat is integrated between the systems to produce the fuel and intermediate products (e.g., ethanol/-isobutanol) from the fuel feedstock to minimize energy requirements.

Conversion process - a type of technology used to convert a feedstock into aviation fuel (reference: Annex 16 Volume IV). For the purposes of this document, the following conversion processes apply:

Short name	***Conversion process specification***	***Description***
Gasification FT	ASTM D7566 Annex A1 (Fischer-Tropsch), or equivalent specification	Fischer-Tropsch hydroprocessed synthesized paraffinic kerosene from gasification of feedstocks such as biomass and coal
CO_2 FT	ASTM D7566 Annex A1 (Fischer-Tropsch), or equivalent specification	Fischer-Tropsch hydroprocessed synthesized paraffinic kerosene with the use of CO_2 as a feedstock
HEFA	ASTM D7566 Annex A2 (HEFA), or equivalent specification	Synthesized paraffinic kerosene from hydroprocessed esters and fatty acids
SIP	ASTM D7566 Annex A3 (SIP), or equivalent specification	Synthesized iso-paraffins from hydroprocessed fermented sugars
FT-SKA	ASTM D7566 Annex A4 (FT-SKA), or equivalent specification	Synthesized kerosene with aromatics derived by alkylation of light aromatics from non-petroleum sources
ATJ-SPK from ethanol	ASTM D7566 Annex A5 (ATJ-SPK), or equivalent specification	Alcohol to jet synthetic paraffinic kerosene, from the use of ethanol as input
ATJ-SPK from isobutanol	ASTM D7566 Annex A5 (ATJ-SPK), or equivalent specification	Alcohol to jet synthetic paraffinic kerosene, from the use of isobutanol as input
ATJ-SPK from isobutene	ASTM D7566 Annex A5 (ATJ-SPK), or equivalent specification	Alcohol to jet synthetic paraffinic kerosene, from the use of isobutene as input
CHJ	ASTM D7566 Annex A6 (CHJ), or equivalent specification	Catalytic hydrothermolysis jet fuel
HC-HEFA-SPK	ASTM D7566 Annex A7 (HC-HEFA-SPK), or equivalent specification	Synthesized paraffinic kerosene from hydrocarbon - hydroprocessed esters and fatty acids
ATJ-SKA	ASTM D7566 Annex A8 (ATJ-SKA), or equivalent specification	Synthetic Paraffinic Kerosene with Aromatics with the use of C2-C5 alcohols from biomass as inputs
Coprocessing Esters and Fatty Acids	ASTM D1655 Annex A1, or equivalent specification	co-processing of Esters and Fatty Acids in a traditional petroleum refinery
Coprocessing of Fischer-Tropsch hydrocarbons	ASTM D1655 Annex A1 - co-processing of Fischer-Tropsch hydrocarbons, or equivalent specification	co-processing of Fischer-Tropsch hydrocarbons in a traditional petroleum refinery
Coprocessing HEFA	ASTM D1655 Annex A1 - co-processing of HEFA, or equivalent specification	co-processing of hydroprocessed esters and fatty acids in a traditional petroleum refinery
Lower Carbon Aviation Fuel	ASTM D1655	fossil-based fuel produced according to the methodologies defined in Chapter 7 of the ICAO Document "CORSIA methodology for calculating actual LCA values"

3 GENERAL PROVISIONS

3.1 Use of default values for L_{CEF} calculation

An aeroplane operator that intends to claim for emissions reductions from the use of CORSIA eligible fuels in a given year may use an Actual Life Cycle Emission Value or a Default Life Cycle emission value to compute these emission reductions (reference: Annex 16 Vol IV Part II Section 3.3.).

A Life Cycle Emissions value (L_{CEF}) is calculated from the following equation:

$$L_{CEF} = \text{core LCA value} + \text{ILUC} - \text{emission credits; where:}$$

a) core LCA value can be obtained in two ways:

  1. a default core LCA value obtained from Section 4 of this document, or
  2. an actual core LCA value calculated with the use of the methodologies described in the ICAO document "*ICAO document - CORSIA Methodology For Calculating Actual Life Cycle Emissions Values"*

b) ILUC value can be obtained in two ways:

  1. Default ILUC values obtained from Section 5 of this document,

     Note: These default ILUC values are directly applicable to feedstocks produced in land that was converted before 1 January 2008. In the event of land use conversion after 1 January 2008, direct land use change (DLUC) emissions will be calculated according to the methodologies defined in Section 8 of the ICAO document "CORSIA methodology for calculating actual life cycle emissions values". If DLUC greenhouse gas emissions exceed the default induced land use change (ILUC) value, the DLUC value will replace the default ILUC value.

     Or

  2. ILUC=0 with the use of the low Land use change (LUC) risk practices provided in Section 5 of the ICAO document "CORSIA methodology for calculating actual life cycle emission values".

c) emission credits can be obtained with the methodologies listed in Section 6 of the ICAO document "CORSIA methodology for calculating actual life cycle emission values". The use of emission credits is optional.

3.1.1 Specific provisions for co-processed fuels

The default core LCA values for co-processed fuels provided in Table 6 and the default ILUC values provided in Table 12 refer only to the biogenic fraction of the fuel. The L_{CEF} of a finished co-processed fuel needs to be calculated as the sum of the L_{CEF} of the two components, weighted by their energy contributions, as provided in Equation 1 below:

$$L_{CEF,CoPro} = \frac{89 * \%Mass_{fossil} * LHV_{fossil} + L_{CEF\ bio} * \%Mass_{bio} * LHV_{bio}}{\%Mass_{fossil} * LHV_{fossil} + \%Mass_{bio} * LHV_{bio}} \quad \text{(eq.1)}$$

Where:

$\%Mass_{fossil}$ *percentage of the final co-processed fuel derived from petroleum, in mass*

$\%Mass_{bio}$ *percentage of the final co-processed fuel derived from SAF feedstocks, in mass*

LHV_{fossil} *lower heating value of the fossil fraction of the fuel*

LHV_{bio} *lower heating value of the biogenic fraction of the fuel*

$L_{CEF\ bio}$ *lifecycle emission value of the biogenic fraction of the fuel* (core LCA value from Table 6 + default ILUC value from Table 12)

The $L_{CEF,\ bio}$ value will be used for the purposes of assessing compliance with Sustainability Criteria 1.1.

Due to the difficulties and the approximations related to the definition of the LHV and %mass for each group of molecules constituting the fuel components, Equation 2 below can be used as a practical solution for operators and the SCS for calculating L_{CEF} of the finished jet fuel from co-processing facilities. This equation allows the calculation of L_{CEF} with the information coming from the process simulation (%vol.) and/or from measurements (for instance with 14C techniques).

$$L_{CEF,CoPro} = 89 * \%vol_{fossil} + L_{CEF\ bio} * \%vol_{bio} \quad \text{(eq.2)}$$

Where:

$\%vol_{fossil}$ *percentage of the final co-processed fuel derived from petroleum, in volume*

$\%vol_{bio}$ *percentage of the final co-processed fuel derived from SAF feedstocks, in volume*

$L_{CEF\ bio}$ *lifecycle emission value of the biogenic fraction of the fuel*

In the case of SAF production by co-processing in a refinery unit certified for LCAF production, eq.3 or eq.4 will be used instead of eq.1 and eq.2. L_{CEF} of the finished co-processed fuel can be calculated as:

$$L_{CEF,CoPro} = \frac{L_{CEF\ LCAF} * \%Mass_{LCAF} * LHV_{LCAF} + L_{CEF\ bio} * \%Mass_{bio} * LHV_{bio}}{\%Mass_{LCAF} * LHV_{LCAF} + \%Mass_{bio} * LHV_{bio}} \quad \text{(eq.3)}$$

Where:

$\%Mass_{LCAF}$	*percentage of the final co-processed LCAF derived from petroleum, in mass*
$\%Mass_{bio}$	*percentage of the final co-processed fuel derived from SAF feedstocks, in mass*
LHV_{LCAF}	*lower heating value of the LCAF fraction of the fuel*
LHV_{bio}	*lower heating value of the biogenic fraction of the fuel*
$L_{CEF\ LCAF}$	*lifecycle emission value of the LCAF fraction defined as per ICAO document "CORSIA Methodology For Calculating Actual Life Cycle Emissions Values"*
$L_{CEF\ bio}$	*lifecycle emission value of the biogenic fraction of the fuel* (core LCA value from Table 6 + default ILUC value from Table 12)

$$L_{CEF,\ CoPro} = L_{CEF\ \mathrm{LCAF}} * \%vol_{\mathrm{LCAF}} + L_{CEF\ bio} * \%vol_{bio} \quad \text{(eq.4)}$$

Where:

$\%vol_{LCAF}$	*percentage of the final co-processed LCAF derived from petroleum, in volume*
$\%vol_{bio}$	*percentage of the final co-processed fuel derived from SAF feedstocks, in volume*
$L_{CEF\ LCAF}$	*lifecycle emission value of the LCAF fraction defined as per ICAO document "CORSIA Methodology For Calculating Actual Life Cycle Emissions Values"*
$L_{CEF\ bio}$	*lifecycle emission value of the biogenic fraction of the fuel*

Note: LCAF eligibility in CORSIA under sustainability criterion 1.1 is evaluated using L_{LCAF} as defined in Section 7 of the ICAO document "CORSIA Methodology for Calculating Actual Life Cycle Emissions Values".

3.2 Applicability provisions

When a default value is updated in a published version of this document, the Economic Operator has until the end of the next full CORSIA compliance cycle to apply the updated pathway information and values to new CEF batches. Therefore, some of the default values listed in Sections 4 and 5 are associated with specific applicability provisions as indicated. Updated values cannot be applied to previously produced CEF batches.

Applicability provisions are applied in Sections 4 and 5 according to the following codes:

[1] most recent value, no temporal restrictions on its use

[2] value can be applied to CEF batches produced until 31 December 2029

[ILUC #.#] and [CLCA #.#] – When both a default core LCA value and a default ILUC value are used to calculate L_{CEF} , these codes limit the application of a given core LCA value with specific ILUC values, and vice-versa.

4 DEFAULT CORE LIFE CYCLE ASSESSMENT (LCA) VALUES FOR CORSIA ELIGIBLE FUELS

To use a default core LCA values in the L_{CEF} calculation, an Aeroplane Operator will have to provide documentation to their State showing compliance with the methodologies defined in this Section. An Aeroplane Operator will need to work with a CEF supplier to obtain this information.

Tables 1 to 6 provide the list of CORSIA Default Core LCA Values that may be used by an aeroplane operator to claim emissions reductions from the use of CORSIA eligible fuels in a given year.

Note: The CORSIA Supporting Document "CORSIA Eligible Fuels - Life Cycle Assessment Methodology" describes the methodologies used by ICAO to calculate these Default Life Cycle Emissions Values, as well as the process for requesting the inclusion of a new conversion process or feedstock on these tables.

Table 1. CORSIA Default Core LCA Values for CORSIA Eligible Fuels produced with the Gasification FT Fuel Conversion Process

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability provisions
1.1	Agricultural residues	Residue removal does not necessitate additional nutrient replacement on the primary crop	7.7	[1]
1.2	Forestry residues		8.3	[1]
1.3	Municipal solid waste (MSW), 0% non-biogenic carbon (NBC)*		5.2	[1]
1.4	Municipal solid waste (MSW) (NBC given as a percentage of the non-biogenic carbon content)*		NBC*170.5 + 5.2	[1]
1.5	Poplar (short-rotation woody crops)		12.2	[1]
1.6	Miscanthus (herbaceous energy crops)		10.4	[1]
1.7	Switchgrass (herbaceous energy crops)		10.4	[1]

**Note: as of the current version of this document, plastics are not included in the list of wastes, residues, or by-products approved by ICAO to produce SAF and claim emissions reductions under CORSIA. Under MSW, plastics will be considered as non-biogenic content.*

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

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability Provisions
2.1	Tallow		22.5	[2]
2.2	Beef Tallow	Relevant lifecycle starts with transportation from slaughterhouse to rendering facility Correction value if hydrogen used is produced from coal: +6.0 gCO_2e/MJ Correction value if process heat is produced from coal: +6.4 gCO_2e/MJ	29.7	[1]
2.3	Poultry fat	Relevant lifecycle starts with transportation from slaughterhouse to rendering facility Correction value if hydrogen used is produced from coal: +7.4 gCO_2e /MJ Correction value if process heat is produced from coal: +6.0 gCO_2e /MJ	33.7	[1]
2.4	Lard fat	Relevant lifecycle starts with transportation from slaughterhouse to rendering facility Correction value if hydrogen used is produced from coal: +6.7 gCO_2e /MJ Correction value if process heat is produced from coal: +5.0 gCO_2e /MJ	27.8	[1]
2.5	Mixed Animal Fats	Relevant lifecycle starts with transportation from slaughterhouse to rendering facility Correction value if hydrogen used is produced from coal: + 6.6 gCO_2e /MJ Correction value if process heat is produced from coal: +5.3 gCO_2e /MJ	28.6	[1]
2.6	Used cooking oil	Correction value if hydrogen used is produced from coal: + 5.7 gCO_2e /MJ Correction value if process heat is produced from coal: +4.9 gCO_2e /MJ	13.9	[1]
2.7	Palm fatty acid distillate	Correction value if hydrogen used is produced from coal: + 6.7 gCO_2e /MJ	20.7	[1]
2.8	Corn oil	Oil from dry mill ethanol plant Correction value if hydrogen used is produced from coal: + 5.6 gCO_2e/MJ	17.2	[1]
2.9	Soybean oilseed	Correction value if hydrogen used is produced from coal: + 5.7 gCO_2e/MJ Correction value if process heat is produced from coal: +4.7 gCO_2e/MJ	40.4	[1]

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability Provisions
2.10	Rapeseed/Canola oilseed	Correction value if hydrogen used is produced from coal: + 5.7 gCO_2e /MJ Correction value if process heat is produced from coal: 4.7 gCO_2e /MJ	47.4	[1]
2.11	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. Correction value if hydrogen used is produced from coal: + 5.7 gCO_2e/MJ	37.4	[1]
2.12	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. Correction value if hydrogen used is produced from coal: + 5.7 gCO_2e/MJ	60.0	[1]
2.13	Brassica carinata oilseed	Correction value if hydrogen used is produced from coal: + 5.7 gCO_2e/MJ Correction value if process heat is produced from coal: + 4.4 gCO_2e/MJ	34.4	[1]
2.14	Camelina oilseed	Correction value if process heat is produced from coal: + 7.7 gCO_2e /MJ	42.0	[1]
2.15	Jatropha oilseed	Meal used as fertilizer or electricity input Correction value if process heat is produced from coal: + 7.7 gCO_2e/MJ	46.9	[1]
2.16	Jatropha oilseed	Meal used as animal feed after detoxification Correction value if process heat is produced from coal: +7.7 gCO_2e/MJ	46.8	[1]
2.17	Non-standard coconuts	Correction value if process heat is produced from coal: + 5.2 gCO_2e/MJ	26.9	[1]
2.18	Palm Oil Mill Effluent (POME)	Correction value if hydrogen is produced from coal: +5.6 gCO_2e/MJ	18.1	[1]

Table 3. CORSIA Default Core LCA Values for CORSIA Eligible Fuels produced with the ATJ-SPK from Isobutanol Conversion Process

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability Provisions
3.1	Agricultural residues	Residue removal does not necessitate additional nutrient replacement on the primary crop. Correction value if process heat is produced from coal: +4.1 gCO_2e/MJ	29.3	[1]
3,2	Forestry residues		23.8	[1]
3.3	Sugarcane	Standalone or integrated conversion design	24.0	[1]
3.4	Corn grain	Standalone or integrated conversion design Correction value if process heat is produced from coal: +16.6 gCO_2e/MJ	55.8	[1]
3.5	Miscanthus (herbaceous energy crops)	Correction value if process heat is produced from coal: +6.8 gCO_2e/MJ	43.4	[1]
3.6	Switchgrass (herbaceous energy crops)	Correction value if process heat is produced from coal: +6.5 gCO_2e/MJ	43.4	[1]
3.7	Molasses		27.0	[1]

Table 4. CORSIA Default Core LCA Values for CORSIA Eligible Fuels produced with the ATJ-SPK from Ethanol Conversion Process

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability Provisions
4.1	Sugarcane	Integrated conversion design	24.1	[1]
4.2	Corn grain	Standalone or integrated conversion design Correction value if process heat is produced from coal: +16.9 gCO_2e/MJ	65.7	[2] [ILUC 10.3, 10.4]
4.3	Agricultural residues	Standalone conversion design Residue removal does not necessitate additional nutrient replacement on the primary crop. Correction value if process heat is produced from coal: +13.6 gCO_2e/MJ	39.7	[1]
4.4	Agricultural residues	Integrated conversion design Residue removal does not necessitate additional nutrient replacement on the primary crop.	24.6	[1]
4.5	Forestry residues	Standalone conversion design Correction value if process heat is produced from coal: +9.9 gCO_2e/MJ	40.0	[2]
4.6	Forestry residues	Integrated conversion design	24.9	[1]
4.7	Miscanthus (herbaceous energy crops)	Standalone conversion design Correction value if process heat is produced from coal: +8.2 gCO_2e/MJ	43.3	[2] [ILUC 10.5, 10.6, 10.7]
4.8	Miscanthus (herbaceous energy crops)	Integrated conversion design	28.3	[1]
4.9	Switchgrass (herbaceous energy crops)	Standalone conversion design Correction value if process heat is produced from coal: +8.2 gCO_2e/MJ	43.9	[2] [ILUC 10.11 10.12]
4.10	Switchgrass (herbaceous energy crops)	Integrated conversion design	28.9	[1]
4.11	Waste gases	Ethanol produced via microbiologic conversion route Standalone conversion design	42.4	[2]
4.12	Waste gases	Ethanol produced via microbiologic conversion route Integrated conversion design	29.4	[1]
4.13	Sugarcane	Standalone conversion design Correction value if there is international ethanol transportation: +6.4 gCO_2e/MJ	41.0	[1] [ILUC 10.15, 10.16]

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability Provisions
4.14	Corn grain	Standalone conversion design Correction value if process heat for ethanol upgrading is produced from coal: + 4.1 gCO_2e /MJ Correction value if process heat for ethanol production (fermentation) is produced from coal: +8.2 gCO_2e /MJ Correction value if process heat for ethanol production (fermentation) and upgrading is produced from coal: +12.3 gCO_2e/MJ Correction value if process hydrogen for ethanol upgrading is produced from coal: +4.3 gCO_2e /MJ	54.1	[1] [ILUC 10.17 10.18]
4.15	Forestry residues	Standalone conversion design Correction value if process heat for ethanol upgrading is produced from coal: +4.1 gCO_2e/MJ Correction value if process hydrogen for ethanol upgrading is produced from coal: +4.3 gCO_2e/MJ	31.8	[1]
4.16	Miscanthus (herbaceous energy crops)	Standalone conversion design Correction value if process heat for ethanol upgrading is produced from coal: +4.1 gCO_2e/MJ Correction value if process hydrogen for ethanol upgrading is produced from coal: +4.3 gCO_2e/MJ	32.1	[1] [ILUC 10.19, 10.20, 10.21]
4.17	Switchgrass (herbaceous energy crops)	Standalone conversion design Correction value if process heat for ethanol upgrading is produced from coal: +4.1 gCO_2e/MJ Correction value if process hydrogen for ethanol upgrading is produced from coal: +4.3 gCO_2e/MJ	33.2	[1] [ILUC 10.25, 10.26]
4.18	Waste gases	Ethanol produced via microbiologic conversion route Standalone conversion design Correction value if process heat for ethanol upgrading is produced from coal: +4.1 gCO_2e/MJ Correction value if process hydrogen for ethanol upgrading is produced from coal: +4.3 gCO_2e/MJ	35.6	[1]

Table 5. CORSIA Default Core LCA Values for CORSIA Eligible Fuels produced with the SIP Conversion Process

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value	Applicability provisions
5.1	Sugarcane	Correction value if hydrogen used is produced from coal: +7.4 gCO_2e/MJ	32.8	[1]
5.2	Sugar beet	Correction value if hydrogen used is produced from coal: +7.2 gCO_2e/MJ	32.4	[1]

Table 6. CORSIA Default Core LCA Values for CORSIA Eligible Fuels produced with the Coprocessing HEFA Conversion process *

Index	Fuel Feedstock	Pathway Specifications	Default Core LCA Value*	Applicability provisions
6.1	Tallow	Maximum of 5% of tallow in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	27.2	[1]
6.2	Used cooking oil	Maximum of 5% of used cooking oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	16.7	[1]
6.3	Soybean oilseed	Maximum of 5% of soybean oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	40.7	[1]

*The default core LCA values in Table 6 refer only to the biogenic fraction of the fuel. The L_{CEF} of a finished co-processed fuel needs to be calculated as the sum of the L_{CEF} of the two components, weighted by their energy contributions, as provided in Section 3.1.1.

5 DEFAULT ILUC VALUES FOR CORSIA ELIGIBLE FUELS

5.1 General provisions

To use default ILUC values in the L_{CEF} calculation, an Aeroplane Operator will have to provide documentation to their State showing compliance with the methodologies defined in this Section. An Aeroplane Operator will need to work with a CEF supplier to obtain this information.

5.2 Default ILUC values for feedstocks classified as wastes, residues, or by-products

Feedstocks that have been classified as wastes, residues, or by-products by ICAO have a default ILUC value of zero, independently from region or conversion process. These feedstocks are listed in Section 4 of the ICAO document "CORSIA methodology for calculating actual life cycle emission values".

5.3 Default ILUC values for feedstocks classified as main products

Feedstocks that have been classified by ICAO as main products are associated with the default ILUC values provided in the Tables 7 to 12 below.

In case CEF is produced from feedstock from different regions, CEF producers will use the ILUC values from the regions where the feedstocks were produced, for the equivalent volume of CEF (under a mass balance chain of custody system).

Table 7. CORSIA Default ILUC Values for CORSIA Eligible Fuels produced with the Gasification FT Conversion Process

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
7.1	USA	Poplar (short-rotation woody crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-5.2	[2]
7.2	Global	Poplar (short-rotation woody crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	8.6	[2]
7.3	USA	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-32.9	[2]
7.4	EU	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-22.0	[2]
7.5	Global	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-12.6	[2]
7.6	USA	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-3.8	[2]
7.7	Global	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	5.3	[2]
7.8	USA	Poplar (short-rotation woody crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-6.5	[1]
7.9	Global	Poplar (short-rotation woody crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	8.9	[1]
7.10	USA	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-33.6	[1]
7.11	EU	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-9.0	[1]
7.12	Global	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-13.8	[1]
7.13	USA	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-5.5	[1]
7.14	Global	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	6.6	[1]

Table 8. CORSIA Default ILUC Values for CORSIA Eligible Fuels produced with the Hydroprocessed Esters and Fatty Acids (HEFA) Conversion Process

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
8.1	USA	Soybean oilseed		24.5	[2]
8.2	Brazil	Soybean oilseed		27.0	[2]
8.3	Global	Soybean oilseed		25.8	[2]
8.4	EU	Rapeseed/Canola oilseed		24.1	[2]
8.5	Global	Rapeseed/Canola oilseed		26.0	[2]
8.6	Malaysia & Indonesia	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.	39.1	[2]
8.7	Malaysia & Indonesia	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.	39.1	[2]
8.8	Brazil	Brassica carinata oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-20.4	[2]
8.9	USA	Brassica carinata oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-21.4	[2]
8.10	Global	Brassica carinata oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-12.7	[2]
8.11	Global	Camelina oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-13.4	[2]
8.12	India	Jatropha oilseed	Meal used as fertilizer or electricity input	-24.8	[2]
8.13	India	Jatropha oilseed	Meal used as animal feed after detoxification	-48.1	[2]
8.14	USA	Soybean oilseed		22.5	[1]
8.15	Brazil	Soybean oilseed		20.7	[1]
8.16	Global	Soybean oilseed		22.5	[1]
8.17	EU	Rapeseed/Canola oilseed		22.8	[1]
8.18	Global	Rapeseed/Canola oilseed		23.9	[1]
8.19	Malaysia & Indonesia	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.	36.6	[1]

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
8.20	Malaysia & Indonesia	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.	36.6	[1]
8.21	Brazil	Brassica carinata oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-14.6	[1]
8.22	USA	Brassica carinata oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-16.1	[1]
8.23	Global	Brassica carinata oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-10.8	[1]
8.24	Global	Camelina oilseed	Feedstock is grown as a secondary crop that avoids other crops displacement	-11.5	[1]
8.25	India	Jatropha oilseed	Meal used as fertilizer or electricity input	-25.6	[1]
8.26	India	Jatropha oilseed	Meal used as animal feed after detoxification	-39.2	[1]

Table 9. CORSIA Default ILUC Values for CORSIA Eligible Fuels produced with the Alcohol to Jet – Isobutanol (ATJ-Isobutanol) Conversion Process

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
9.1	Brazil	Sugarcane	Standalone or integrated conversion design	7.3	[2]
9.2	Global	Sugarcane	Standalone or integrated conversion design	9.1	[2]
9.3	USA	Corn grain	Standalone or integrated conversion design	22.1	[2]
9.4	Global	Corn grain	Standalone or integrated conversion design	29.7	[2]
9.5	USA	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-54.1	[2]
9.6	EU	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-31.0	[2]
9.7	Global	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-23.6	[2]
9.8	USA	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-14.5	[2]
9.9	Global	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	5.4	[2]
9.10	Brazil	Molasses		7.3	[2]
9.11	Global	Molasses		9.1	[2]
9.12	Brazil	Sugarcane	Standalone or integrated conversion design	9.2	[1]
9.13	Global	Sugarcane	Standalone or integrated conversion design	9.9	[1]
9.14	USA	Corn grain	Standalone or integrated conversion design	17.1	[1]
9.15	Global	Corn grain	Standalone or integrated conversion design	25.6	[1]
9.16	USA	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-54.2	[1]
9.17	EU	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-17.3	[1]
9.18	Global	Miscanthus (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-25.2	[1]
9.19	USA	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	-15.4	[1]

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
9.20	Global	Switchgrass (herbaceous energy crops)	Feedstock is produced according to the definitions and guidance provided in Section 5.4	4.9	[1]
9.21	Brazil	Molasses		9.2	[1]
9.22	Global	Molasses		9.9	[1]
9.23	Brazil	Corn grain	Feedstock produced under sequential cropping as the secondary or additional crop Only sequential cropping implemented on cropland where the primary crop was established prior to 2016 is eligible Standalone or integrated conversion design	9.1	Values provisionally allowed for CEF produced until 31 December 2029. A decision on whether to continue allowing these values will be made prior to that date.

Table 10. CORSIA Default ILUC Values for CORSIA Eligible Fuels produced with the Alcohol to Jet – Ethanol (ATJ-Ethanol) Conversion Process

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
10.1	Brazil	Sugarcane	Integrated conversion design	8.7	[1]
10.2	Global	Sugarcane	Integrated conversion design	8.5	[1]
10.3	USA	Corn grain	Standalone or integrated conversion design	25.1	[2] [CLCA 4.2]
10.4	Global	Corn grain	Standalone or integrated conversion design	34.9	[2] [CLCA 4.2]
10.5	USA	Miscanthus (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-42.6	[2] [CLCA 4.7]
10.6	EU	Miscanthus (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-23.3	[2] [CLCA 4.7]
10.7	Global	Miscanthus (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-19.0	[2] [CLCA 4.7]
10.8	USA	Miscanthus (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-42.6	[2]
10.9	EU	Miscanthus (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-23.3	[2]
10.10	Global	Miscanthus (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-19.0	[2]
10.11	USA	Switchgrass (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-10.7	[2] [CLCA 4.9]
10.12	Global	Switchgrass (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	4.8	[2] [CLCA 4.9]
10.13	USA	Switchgrass (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-10.7	[2]
10.14	Global	Switchgrass (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	4.8	[2]

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
10.15	Brazil	Sugarcane	Standalone conversion design	11.0	[1] [CLCA 4.13]
10.16	Global	Sugarcane	Standalone conversion design	11.9	[1] [CLCA 4.13]
10.17	USA	Corn grain	Standalone or integrated conversion design	18.3	[1] [CLCA 4.14]
10.18	Global	Corn grain	Standalone or integrated conversion design	26.2	[1] [CLCA 4.14]
10.19	USA	Miscanthus (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-40.8	[1] [CLCA 4.16]
10.20	EU	Miscanthus (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-11.8	[1] [CLCA 4.16]
10.21	Global	Miscanthus (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-19.2	[1] [CLCA 4.16]
10.22	USA	Miscanthus (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-40.8	[1]
10.23	EU	Miscanthus (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-11.8	[1]
10.24	Global	Miscanthus (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-19.2	[1]
10.25	USA	Switchgrass (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	5.7	[1] [CLCA 4.17]
10.26	Global	Switchgrass (herbaceous energy crops)	Standalone conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-11.3	[1] [CLCA 4.17]
10.27	USA	Switchgrass (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	5.7	[1]
10.28	Global	Switchgrass (herbaceous energy crops)	Integrated conversion design Feedstock is produced according to the definitions and guidance provided in Section 5.4	-11.3	[1]

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
10.29	Brazil	Corn grain	Feedstock produced under sequential cropping as the secondary or additional crop Only sequential cropping implemented on cropland where the primary crop was established prior to 2016 is eligible Standalone or integrated conversion design	9.3	Values provisionally allowed for CEF produced until 31 December 2029. A decision on whether to continue allowing these values will be made prior to that date.

Table 11. CORSIA Default ILUC Values for CORSIA Eligible Fuels produced with the Synthesized iso-paraffins (SIP) Conversion Process

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
11.1	Brazil	Sugarcane		11.3	[2]
11.2	Global	Sugarcane		11.1	[2]
11.3	EU	Sugar beet		20.2	[2]
11.4	Global	Sugar beet		11.2	[2]
11.5	Brazil	Sugarcane		14.9	[1]
11.6	Global	Sugarcane		19.8	[1]
11.7	EU	Sugar beet		17.6	[1]
11.8	Global	Sugar beet		9.4	[1]

Table 12. CORSIA Default ILUC Values for CORSIA Eligible Fuels produced with the Hydroprocessed Esters and Fatty Acids (HEFA) Conversion Process co-processed at petroleum refineries*

Index	Region	Fuel Feedstock	Pathway Specifications	Default ILUC value	Applicability provisions
12.1	USA	Soybean oilseed	Maximum of 5% of soybean oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	24.5	[2]
12.2	Brazil	Soybean oilseed	Maximum of 5% of soybean oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	27.0	[2]
12.3	Global	Soybean oilseed	Maximum of 5% of soybean oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	25.8	[2]
12.4	USA	Soybean oilseed	Maximum of 5% of soybean oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	22.5	[1]
12.5	Brazil	Soybean oilseed	Maximum of 5% of soybean oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	20.7	[1]
12.6	Global	Soybean oilseed	Maximum of 5% of soybean oil in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points	22.5	[1]

5.4 Specific provisions for cellulosic feedstocks associated with negative ILUC values

The SAF pathways that use cellulosic feedstocks should only use marginal land to produce these feedstocks. Marginal is defined as:

Agricultural land parcels that are not used for crop production or other agricultural products for 36 consecutive months and/or land parcels that are not excluded by Sustainability Criterion 2.1 and perform in the lowest tercile of proper norms for a comparable land type in the ICAO Member State[1], or first level administrative division of the ICAO Member State of feedstock production will be considered as marginal land for planting cellulosic feedstock. A non-exhaustive list of norms could include: yield, soil properties and conditions, moisture conditions, and economic variables.

SCSs will follow the CORSIA guidance provided in Section 5.4.1 to identify land marginality.

5.4.1 Guidance to verify compliance with the cellulosic pathway specification

Definition: In this guidance the term ***converted land*** refers to the land that is selected to produce cellulosic feedstocks for SAF.

Thes definition of marginal land considers two groups of land:

Group 1) *Agricultural land parcels that are not used for crop production or other agricultural products for 36 months prior to the date of land conversion for feedstock.*

For this group of land, SCSs could use the existing records (including but not limited to satellite data) to identify the use of converted land for 36 months prior to the date of land conversion for cellulosic feedstock production.

Group 2) *Land parcels that are not excluded by Sustainability Criterion 2.1 and perform in the lowest tercile of proper norms in the country or state (or province) of feedstock production.*

For this group of land, SCSs should consider the following verification steps:

Step 1: Verify compatibility of the converted land to feedstock production with Sustainability Criterion 2.1. If the converted land meets this criterion, check the next step. Otherwise, the converted land is not qualified to produce cellulosic feedstocks for SAF.

Step 2: Select a proper norm to assess quality of the converted land before conversion to feedstock production. Depending on the type of converted land, SCSs may use different norms to evaluate quality of land. For converted cropland to cellulosic feedstocks, yield is an appropriate norm. For non-cropland converted to cellulosic feedstocks, other norms can be used, e.g., annual economic return per hectare.

Step 3: Select the geographical boundary of the investigation depending on data availability: either State, or first level administrative division of the State. Information from the first level administrative division of the State should be used only in the absence of State-level information.

Step 4: Collect representative data to determine the distribution of the selected norm and its lowest tercile for the selected geographical boundary. If the converted land falls in the lowest tercile of the distribution, it is qualified to be used for producing cellulosic feedstock. The following formula provides a threshold for the lowest tercile of the selected norm:

[1] The official list of ICAO Member States is available at https://www.icao.int/about-icao/Pages/member-states.aspx

$$T_i = MIN_i + (MAX_i - MIN_i)/3$$

In this formula *i* is an index that represents the selected norm (e.g., yield or rent), T_i shows the higher end of the first tercile of the selected norm, MAX_i is the largest observed value of the selected norm, and MIN_i is the lowest observed value of the selected norm.

Step 5: Compare T_i with the size of the measured norm (M_i) for the converted land to feedstock production. If $M_i < T_i$, then the selected land qualifies for cellulosic feedstock production. If data is available it is preferred to calculate the average for each variable (T_i, MAX_i, MIN_i, and M_i) for three years prior to land conversion.

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