ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT): 2025 Version

— Design, Development and Validation —

October 2025

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1. INTRODUCTION

To facilitate the implementation of the Standards and Recommended Practices relating to the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) was developed. The ICAO document entitled "ICAO CORSIA CO_2 Estimation and Reporting Tool" is referenced in Annex 16, Volume IV, Appendix 3, and is referred to as an ICAO CORSIA Implementation Element.

The ICAO CORSIA CERT tool supports aeroplane operators in:

a) assessing whether or not an aeroplane operator is within the applicability scope of the Monitoring, Reporting and Verification (MRV) requirements (Annex 16, Volume IV, Part II, Chapter 2, 2.1);

b) assessing their eligibility to use fuel use monitoring methods in support of their Emissions Monitoring Plan (Annex 16, Volume IV, Part II, Chapter 2, 2.2);

c) filling any CO_2 emissions data gaps (Annex 16, Volume IV, Part II, Chapter 2, 2.5); and

d) fulfilling their monitoring and reporting requirements by supporting the development of the standardized Emissions Monitoring Plan and Emissions Report templates (Appendix 1 of the *Environmental Technical Manual* (Doc 9501), Volume IV – *Procedures for demonstrating compliance with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*).

ICAO's Committee on Aviation Environmental Protection (CAEP) will develop and recommend updates to the ICAO CORSIA CERT information that will be captured in some form of ICAO document and, following approval by the ICAO Council, the ICAO CORSIA Implementation Element will be published on the ICAO CORSIA website (www.icao.int/corsia).

2. HIGH LEVEL ARCHITECTURE AND EVOLUTION OF THE ICAO CORSIA CERT

2.1 General Overview

The ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) is expected to be updated and enhanced over time to reflect: (1) evolving requirements from the implementation of CORSIA (i.e., Annex 16, Volume IV) such as the phased implementation of CORSIA reflected in the ICAO document entitled "CORSIA States for Chapter 3 State Pairs" that will be available on the ICAO CORSIA website from 2020, (2) increasing data coverage in terms of aeroplane types and geographic distribution; and (3) improvements in fuel efficiency observable from input data and resulting from technology and operations. A version/release of the tool is expected to be only valid for a given reporting year.

With the 2018 version of the ICAO CORSIA CERT, an aeroplane operator, that uses the CO_2 estimation functionality of the ICAO CORSIA CERT, was able to estimate for each year if its annual CO_2 emissions are above the thresholds as described in Annex 16, Volume IV [1].

[1] The Standards and Recommended Practices of Annex 16, Volume IV, Part II, Chapter 2 shall be applicable to an aeroplane operator that produces annual CO_2 emissions greater than 10 000 tonnes from the use of an aeroplane(s) with a maximum certificated take-off mass greater than 5 700 kg conducting international flights, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, on or after 1 January 2019, with the exception of humanitarian, medical and firefighting flights.
The Standards and Recommended Practices of Annex 16, Volume IV, Part II, Chapter 2 shall not be applicable to international flights, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, preceding or following a humanitarian, medical or firefighting flight provided such flights were conducted with the same aeroplane, and were required to accomplish the related humanitarian, medical or firefighting activities or to reposition thereafter the aeroplane for its next activity. The aeroplane operator shall provide supporting evidence of such activities to the verification body or, upon request, to the State.

An aeroplane operator was also able to determine its eligibility to use simplified compliance procedures (as per Annex 16, Volume IV, Part II, Chapter 2, 2.2)[2]. The ICAO CORSIA CERT was based on the ICAO CO_2 Estimation Models (CEMs) that capture the set of equations that allow to estimate for a given aeroplane type the CO_2 emissions as a function of Great Circle Distance.

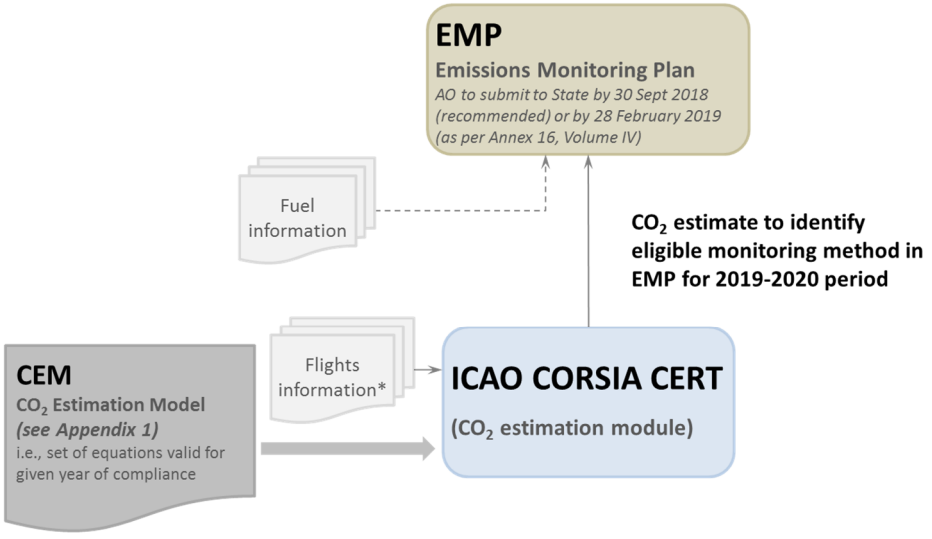


Figure 1: Architecture of CORSIA Emissions Monitoring Plan and reporting system (2018 or aeroplane operator year of entry into CORSIA)

Starting with the 2019 version of the ICAO CORSIA CERT, aeroplane operators can comply with simplified monitoring and reporting requirements from Annex 16, Volume IV, Part II, Chapter 2. The ICAO CORSIA CERT will allow aeroplane operators to import or manually input the required information: (1) individual or aggregated information at the individual flight, or aerodrome-pair level, (2) flights for which there are data gaps to generate emissions estimations.

Aeroplane operators eligible to use simplified compliance procedures (as per Annex 16, Volume IV, Chapter 2, 2.2) will be able to manually and/or automatically input information at individual flight level to estimate their CO_2 emissions for the compliance year and generate the Emissions Report.

Figure 3 summarizes the evolution of the functionalities of the ICAO CORSIA CERT, where the 2018 version only included the CO_2 estimation functionality to determine the applicability of CORSIA and

[2] For the 2019-2020 period: the aeroplane operator with annual CO_2 emissions from international flights, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 2, 2.1, greater than or equal to 500 000 tonnes shall use a Fuel Use Monitoring Method as described in Appendix 2. The aeroplane operator with annual CO_2 emissions from international flights, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 2, 2.1 of less than 500 000 tonnes shall use either a Fuel Use Monitoring Method or the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT), as described in Annex 16, Volume IV, Appendices 2 and 3 respectively.
For the 2021-2035 period: the aeroplane operator, with annual CO_2 emissions from international flights subject to offsetting requirements, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 3, 3.1, of greater than or equal to 50 000 tonnes, shall use a Fuel Use Monitoring Method as described in Annex 16, Volume IV, Appendix 2 for these flights. For international flights, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 2, 2.1, not subject to offsetting requirements, as defined in Annex 16, Volume IV, Part II, Chapter 3, 3.1, the aeroplane operator shall use either a Fuel Use Monitoring Method, as described in Annex 16, Volume IV, Appendix 2, or the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT), as described in Annex 16, Volume IV, Appendix 3. The aeroplane operator, with annual CO_2 emissions from international flights subject to offsetting requirements, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 3, 3.1, of less than 50 000 tonnes, shall use either a Fuel Use Monitoring Method or the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) as described in Annex 16, Volume IV, Appendices 2 and 3 respectively.

eligibility to the use of the ICAO CORSIA CERT. The 2019 and 2020 versions include the monitoring and report generation functionality. The 2021-2035 versions will then include splitting of the emissions between those subject to offsetting requirements, as they belong to routes between pairs of participating States, and those that have only to be reported but that are not subject to offsetting requirements.

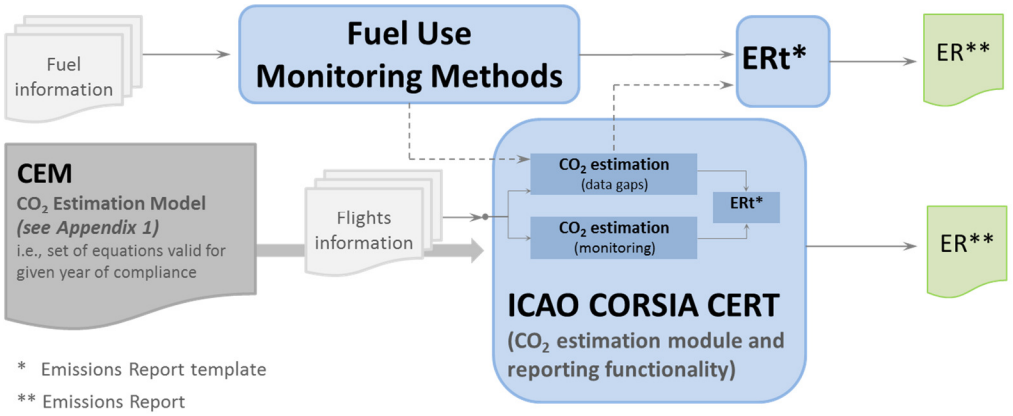


Figure 2: Architecture of CORSIA reporting system (2019 onward for compliance purposes)

	CERT CO_2 Estimation and Reporting Tool		
Year of validity	2018	2019-2020	2021-2035
Estimation of CO_2 for determination of simplified compliance procedures eligibility	Yes	Yes	Yes
Monitoring (estimating CO_2)	No	Yes	Yes
Report generation functionality	No	Yes	Yes
States for Chapter 3 State pairs	No	No	Yes

Figure 3: Phased development and implementation of the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT)

2.2 Architecture of the 2025 Version of the ICAO CORSIA CERT

Based on requirements from Annex 16 Volume IV, a more detailed architecture of the 2025 version of the ICAO CORSIA CERT was developed. First, potential and expected users of the CERT were identified. Through an iterative process of mapping processes/tasks by different users required functionalities were identified.

2.2.1 Potential Users of the ICAO CORSIA CERT 2025

Figure 4 shows the list of potential users of the ICAO CORSIA CERT along with whether they have a submitted/approved EMP, their primary monitoring method, description of the use of the CERT and needed functionalities.

Users	Submitted/Approved EMP	Primary Monitoring Method (PMM)	Description of Use of the CERT	Needed Functionalities
Aeroplane Operators	**Yes**	Eligible to use the CERT as PMM	Estimating emissions and filling ER using the CERT (only)	- CO_2 Estimation - ER generation
Aeroplane Operators	**Yes**	Required to use a Fuel Use Monitoring Method as PMM	Using the CERT to fill data gaps and generate ER	- CO_2 Estimation - ER generation
Aeroplane Operators	**Yes**	Required to use a Fuel Use Monitoring Method as PMM	Using the CERT to fill data gaps	- CO_2 Estimation - Summary Assessment
Aeroplane Operators	**No**	n/a	Evaluating applicability of CORSIA and eligibility to use the CERT	- CO_2 Estimation - Summary Assessment
States	n/a	n/a	Order of Magnitude checks and Data gap filling	- CO_2 Estimation - Summary Assessment
ICAO	n/a	n/a	Data gap filling	- CO_2 Estimation - Summary Assessment
Verifiers	n/a	n/a	Order of Magnitude checks	- CO_2 Estimation - Summary Assessment

Figure 4: Potential Users of the ICAO CORSIA CERT 2019+ versions

2.2.2 ICAO CORSIA CERT 2019+ High-Level Architecture

The ICAO CORSIA CERT 2025 version was built on the 2024 version with regard to the input of aeroplane operator information, the CO_2 estimation and the generation of a summary assessment functionalities. To meet the additional requirements from monitoring of emissions according to Annex 16 Volume IV, additional functionalities will be added in the 2019+ versions, including;

- ICAO CEMs: The 2025 version of the ICAO CORSIA CERT contains an updated set of ICAO CEMs based on the 2025 version of the COFdb.

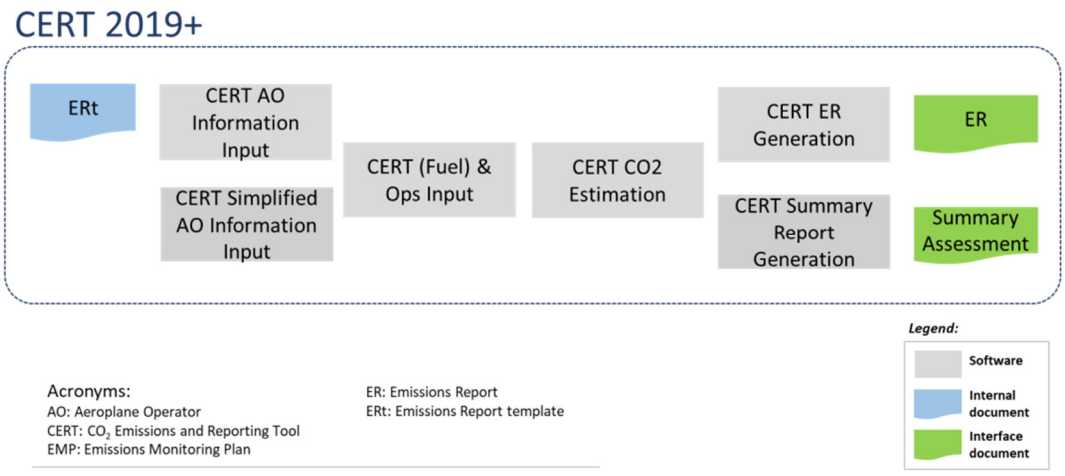


Figure 5: High Level Architecture of the 2019+ versions of the ICAO CORSIA CERT

In accordance with the requirements from Annex 16 Volume IV and the ETM Volume IV, the 2018 version of the ICAO CORSIA CERT only required the CO_2 estimation functionality and no reporting capabilities. The reporting functionality was added to the 2019 version which will be used by aeroplane operators to monitor (via estimation) and report their 2019 CO_2 emissions as well as to fill data gaps if needed. The template of the Emissions Report based on the Second Edition of the Environmental Technical Manual (ICAO Doc 9501) was integrated into the CERT 2025. The ICAO CORSIA CERT allows operators to automatically fill and export the Emissions Report.

2.2.3 Detailed Use Cases for the ICAO CORSIA CERT 2019+

Figure 6 shows the processes expected to be followed by an aeroplane operator for which the State has approved the submitted EMP and the right to use the ICAO CORSIA CERT as a primary monitoring method. This (aeroplane operator) user would also use the ICAO CORSIA CERT to generate its Emissions Report.

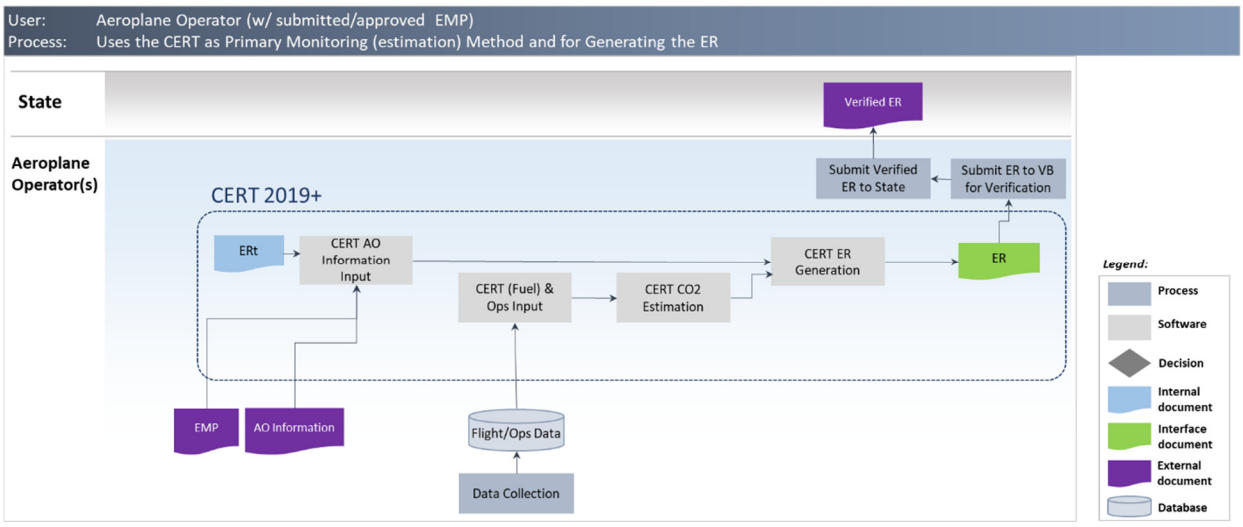


Figure 6: Mapping of processes supported by the 2019+ versions of the ICAO CORSIA CERT for an aeroplane operator with an approved EMP and using the ICAO CORSIA CERT as primary monitoring method and to generate its ER

Figure 7 shows the processes expected to be followed by an aeroplane operator for which the State has approved the submitted EMP and that uses the ICAO CORSIA CERT to fill data gaps (i.e., flights with no data from the approved Fuel Use Monitoring Method). This (aeroplane operator) user would also use the ICAO CORSIA CERT to generate its Emissions Report.

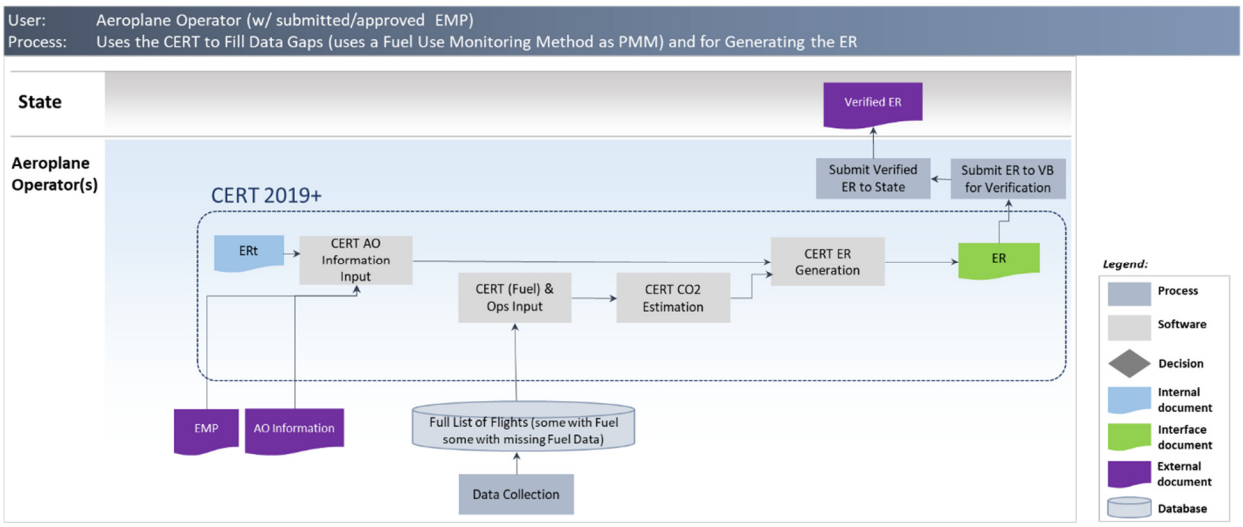


Figure 7: Mapping of processes supported by the 2019+ versions of the ICAO CORSIA CERT for an aeroplane operator with an approved EMP and using the ICAO CORSIA CERT to fill data gaps and generate its ER

Figure 8 shows the processes expected to be followed by an aeroplane operator that uses the ICAO CORSIA CERT only to estimate the fuel and emissions for data gaps (i.e., flights with no data from the approved Fuel Use Monitoring Method). This (aeroplane operator) user would not use the ICAO CORSIA CERT to generate its Emissions Report.

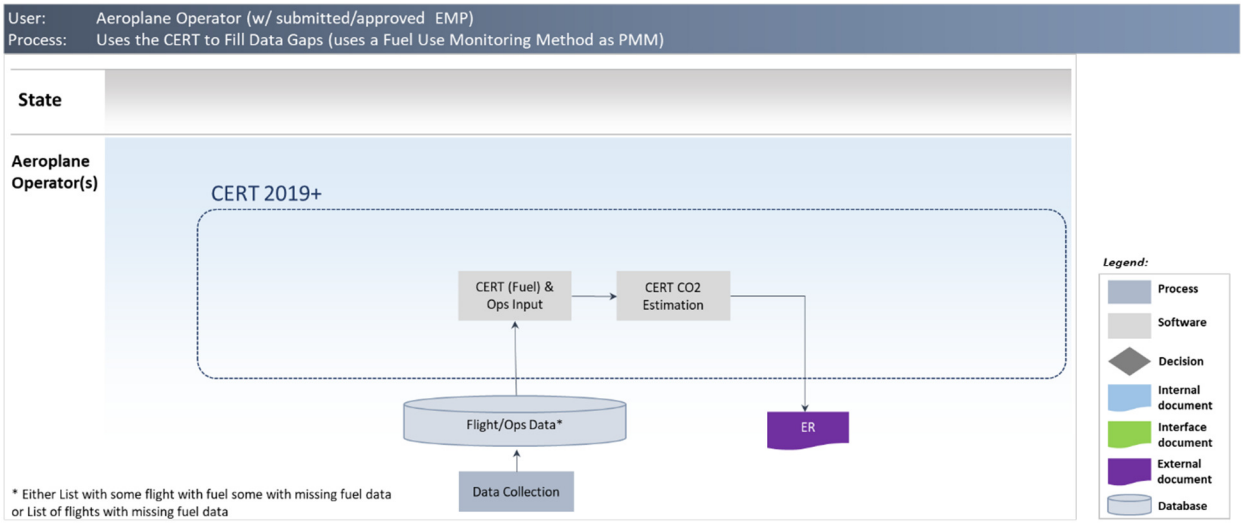


Figure 8: Mapping of processes supported by the 2019+ versions of the ICAO CORSIA CERT for an aeroplane operator using the ICAO CORSIA CERT only to fill data gaps

Figure 9 shows the processes expected to be followed by an aeroplane operator to determine the applicability of CORSIA and eligibility to user the ICAO CORSIA CERT. Note: this process is similar to the use of the 2018 version of the ICAO CORSIA CERT.

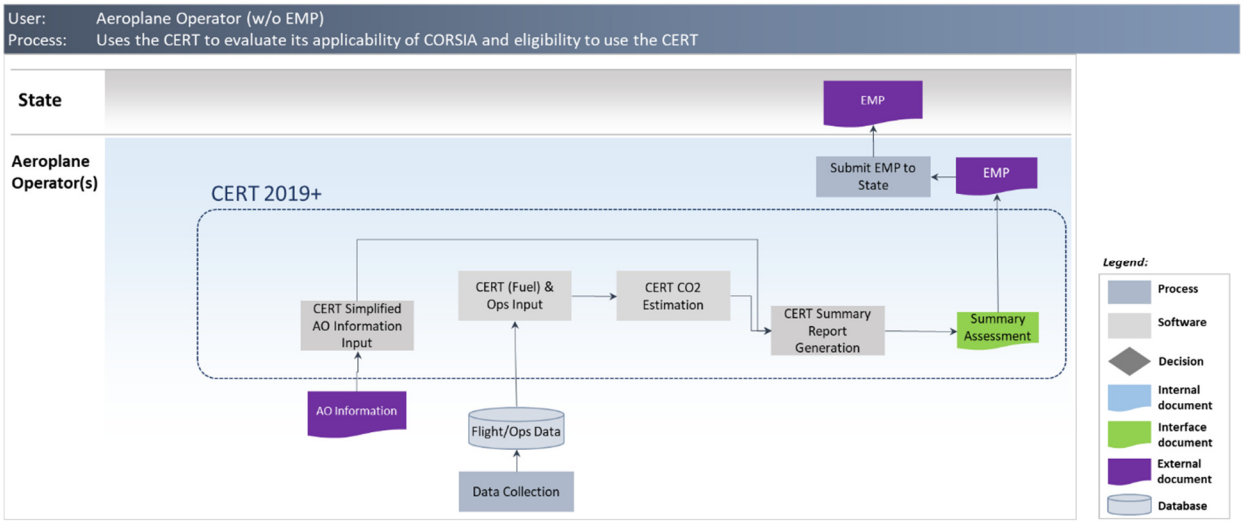


Figure 9: Mapping of processes supported by the 2019+ versions of the ICAO CORSIA CERT for an aeroplane operator to determine the applicability of CORSIA and eligibility to user the ICAO CORSIA CERT

Figure 10 shows the processes expected to be followed by a State to fill data gaps.

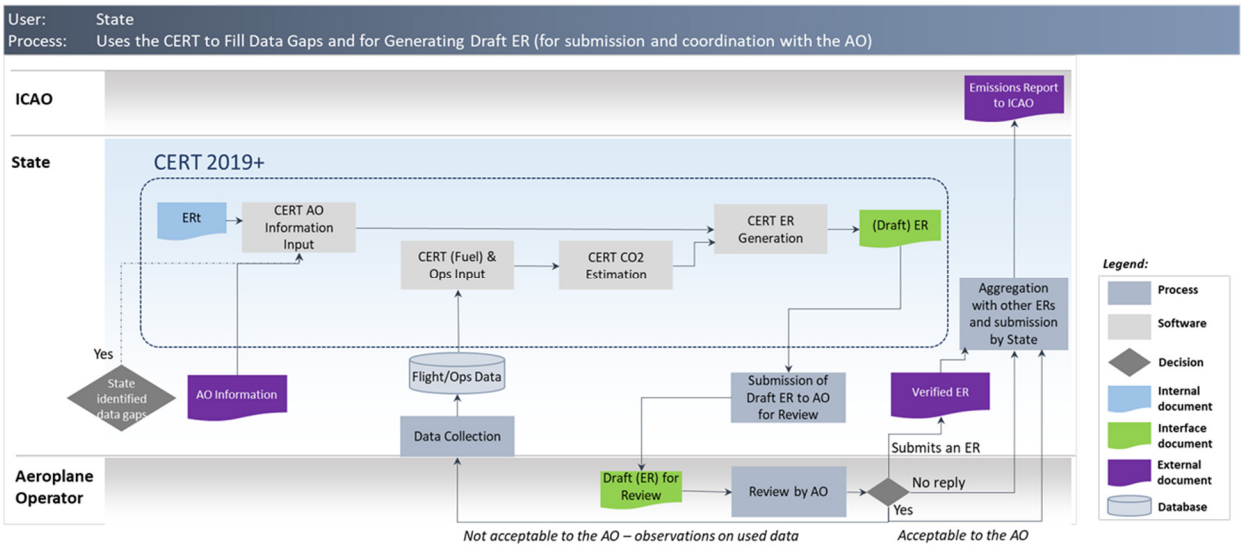


Figure 10: Mapping of processes supported by the 2019+ versions of the ICAO CORSIA CERT for a State to fill data gaps

Figure 11 shows the processes expected to be followed by ICAO to fill data gaps.

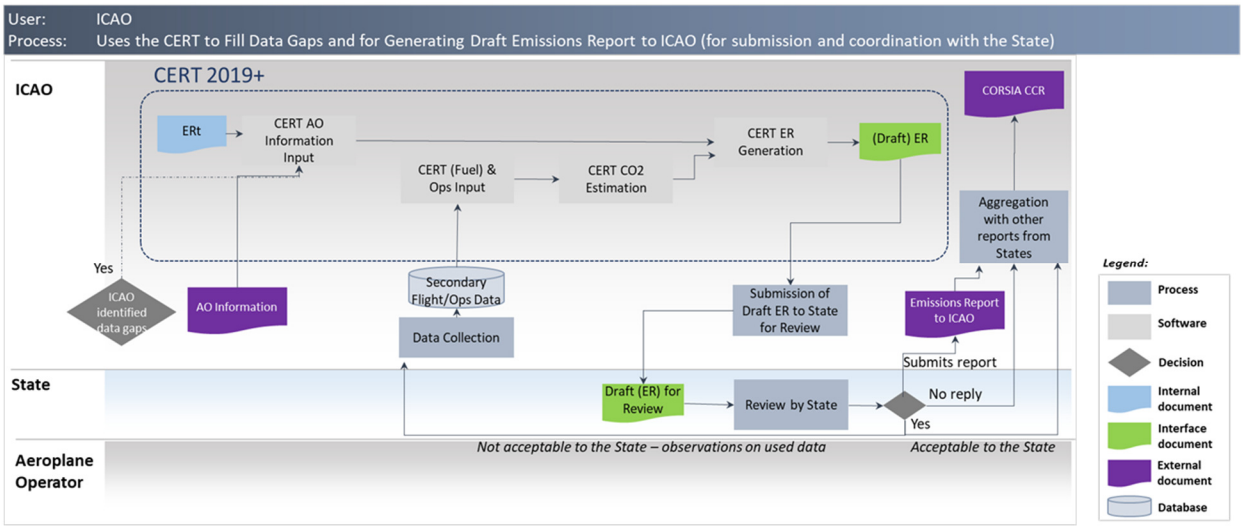


Figure 11: Mapping of processes supported by the 2019+ versions of the ICAO CORSIA CERT for ICAO to fill data gaps

3. DESIGN AND DEVELOPMENT OF THE ICAO CORSIA CERT

Based on assessment conducted by the ICAO-CAEP of the potential candidate methods that could be used as a basis for a CO_2 estimation tool, it was recommended that a modeling approach and tool based on a statistical method was most appropriate and fit for purpose for developing the ICAO CEMs underlying the ICAO CORSIA CERT. The statistical method is based on actual historic fuel burn data, provided by aeroplane operators, that are used to establish statistical models to estimate fuel burn for a particular distance or time and aircraft type. Similar to the Fuel Use Monitoring Methods as described in Annex 16, Volume IV, Appendix 2, a menu of ICAO CEMs based on Great Circle Distance input or Block Time input could provide flexibility to aeroplane operators to meet the monitoring and reporting requirements from the CORSIA.

3.1 Functionality of the ICAO CORSIA CERT

The ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) comprises a three-step process as described in Figure 12. This includes:

(1) Entering aeroplane operator's information (to meet the requirements of the Emissions Report template per the *Environmental Technical Manual* (Doc 9501), Volume IV);

(2) Entering flight data either manually or using a file upload, to estimate CO_2 emissions using either the Block Time or Great Circle Distance (GCD). The user enters a) Aircraft type and b) aerodrome designator for origin-destination based on Doc 7910 — *Location Indicators* (i.e., Great Circle Distance GCD) or flight operating time (i.e., Block Time) as input to estimate an aeroplane operator's CO_2 emissions; and

(3) Generating the Emissions Report, reviewing and submitting it.

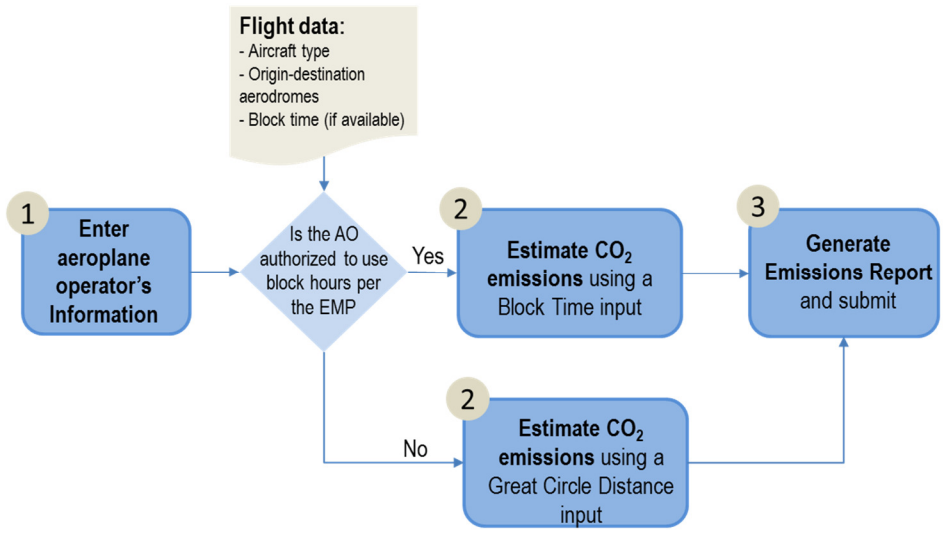


Figure 12: Overview of the high-level functions of the potential CORSIA CO_2 Estimation and Reporting Tool

3.2 Development of the ICAO CO_2 Estimation Models (CEMs)

Underlying the ICAO CORSIA CERT CO_2 estimation functionality (i.e., step 2 in Figure 12), the ICAO CEMs allow to convert the users input (i.e., aircraft types, aerodromes of origin and destination, Block Time if available) into estimated CO_2 emissions.

3.2.1 Overview of the Process for Developing ICAO CEMs

Figure 13 shows an overview of the process for developing the ICAO CEMs. First, the list of aircraft types, by ICAO Type Designator, for which an ICAO CEM needs to be established were scoped and identified. Doc 8643 — *Aircraft Type Designators* [3] was analyzed to identify those aircraft types that are within the scope of applicability of Annex 16, Volume IV, i.e., Maximum Take Off Mass (MTOM) greater than 5 700 kg. Because Doc 8643 does not include MTOM information, several information sources, including: the EASA Certification Database, the ICAO Noise Certification database, and complementary information such as the US FAA Type Certificate Data Sheets (TCDS) were used and mapped to each aircraft type designators in Doc 8643. The identified aircraft types form the basis for the ICAO CORSIA CERT aeroplane database. Section 3.2.2 provides additional information about the process for scoping the ICAO CORSIA CERT aeroplane database.

For each of the aircraft types identified in the scoping process described above, an ICAO CEM was developed. As shown in Figure 13, a four-tier approach was developed and implemented:

(1) First, if the aircraft type can be mapped to an aircraft type available in the validated CCG Operations and Fuel database (COFdb), an ICAO CEM is developed using the methodology described in section 3.2.3;

(2) Second, if the aircraft type is not available in the COFdb but there is an equivalent aircraft type which is modeled using (1) within the same family (and same manufacturer), an ICAO CEM is developed through scaling of the ICAO CEM of the equivalent aircraft type, using the method described in 3.2.4;

[3] *ICAO Document* Aircraft Type Designators *(Doc 8643),* available for query at: https://www.icao.int/publications/DOC8643/Pages/Search.aspx

(3) Third, if the aircraft type is not mapped to the COFdb via steps 1 or 2, then the ICAO Fuel Formula is used, (see section 3.2.5 for background on the ICAO Fuel Formula); and

(4) Finally, if an aircraft type is missing an ICAO CEM after steps 1 to 3, a generic equation can be developed using the methodology described in section 3.2.6. This approach is used for aircraft types identified in Appendix A-1 (Table A-1.2.d) as well as aircraft types that can be entered into the ICAO CORSIA CERT as Custom Aeroplane.

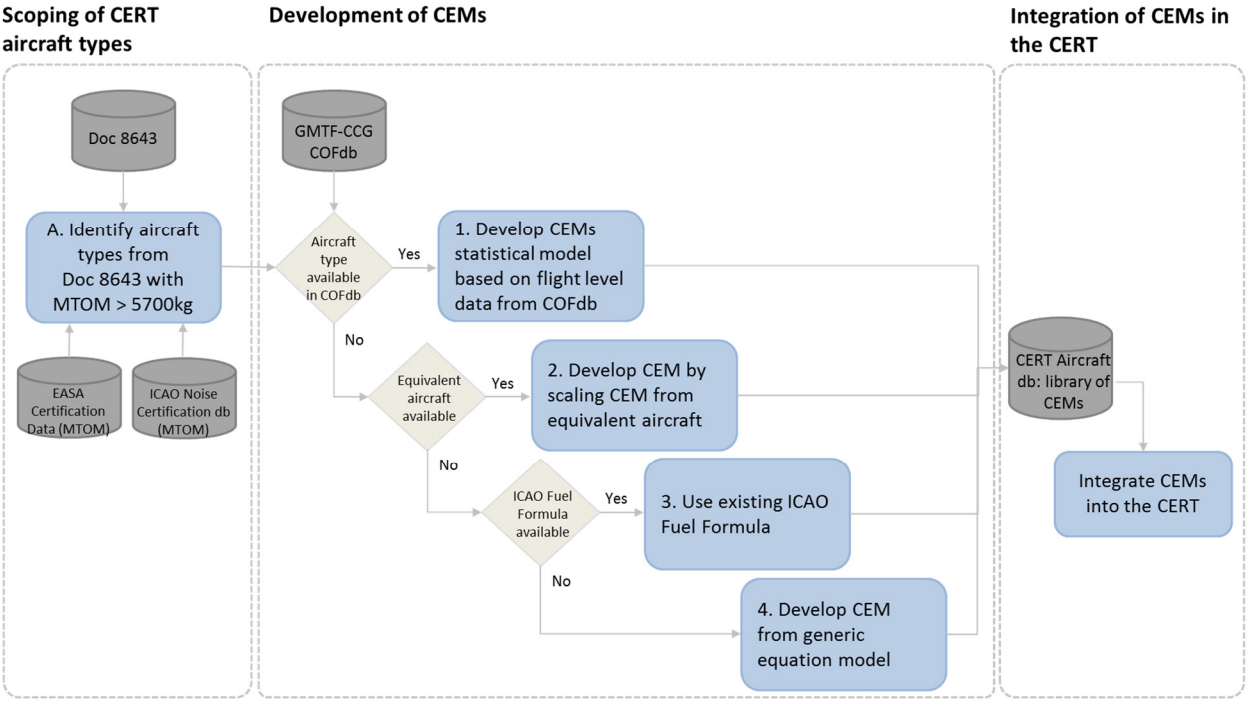


Figure 13: Summary of process for developing ICAO CO_2 Emissions Estimation Models (CEMs)

3.2.2 Scoping of ICAO CORSIA CERT aeroplane database

Users of the ICAO CORSIA CERT can enter aircraft type by ICAO Type Designator (e.g., B738 for a Boeing B737-800 or A321 for an Airbus A321). The Type Designators are consistent with Doc 8643 — *Aircraft Type Designators which is filtered to only include aircraft types that are under the scope of applicability of Annex 16, Volume IV (i.e., Maximum Take Off Mass (MTOM) greater than 5 700 kg).*

Data sources

- Doc 8643:
    - The 2025 version of the ICAO CORSIA CERT is based on the version of Doc 8643 that was last updated on 03 July 2025.
- Maximum Take Off Mass (MTOM):
    - The following version of the EASA Noise Certification Databases (www.easa.europa.eu/document-library/noise-type-certificates-approved-noise-levels) were used to obtain MTOM data by aircraft type.
        - EASA approved noise levels (Heavy propeller driven aeroplanes), Issue 35, last updated: 28 October 2021

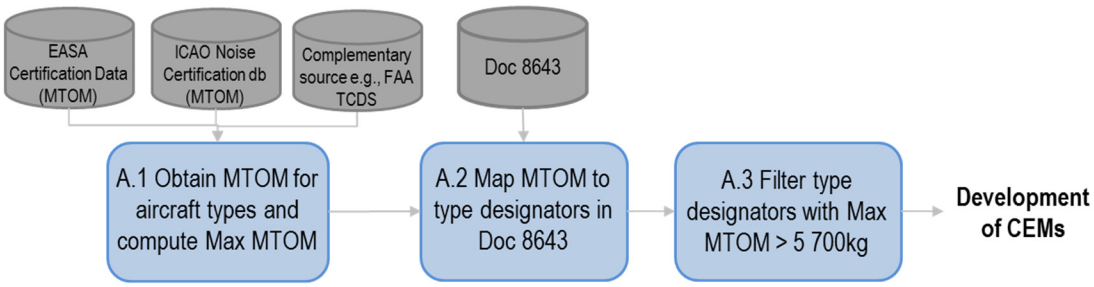
- EASA approved noise levels (Jet aeroplanes), Issue 37, last updated: 28 October 2021
- EASA approved noise levels (Light propeller driven aeroplanes), Issue 37, last updated: 28 October 2021

- In addition, the ICAO Noise Certification Database, version 2.24 that was validated by the CAEP Working Group 1 (WG1) on the 8th November 2017 was used. The Noise Certification database is available at: http://noisedb.stac.aviation-civile.gouv.fr
- Complementary data sources were also used when needed, including the U.S. Federal Aviation Administration (FAA) Type Certificate Data Sheet (TCDS), available at: http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/Frameset?OpenPage

Methodology

To ensure that aircraft types (by Type Designator) with a variant greater than 5 700 kg Maximum Take-Off Mass (MTOM) is available in the ICAO CORSIA CERT, the Maximum MTOM was derived from across aeroplane variants and the multiple available MTOM databases.

Figure 14 illustrates the process for filtering aircraft types with MTOM greater than 5 700 kg. Aircraft types from the MTOM databases were mapped to Doc 8643 — Aircraft Type Designators. The Maximum MTOMs were then used to filter and identify Type Designators with MTOM greater than 5700 kg.



Doc 8643 has total of 10 020 aircraft types categorized as Amphibian, Helicopter, Landplane, SeaPlane or Tilt-wing. Further, each aircraft type has the manufacturer's name, ICAO Designator, engine type, engine count and wake turbulence category (WTC).

Doc 8643 has wake turbulence category (WTC) designated for each aircraft type. The WTCs are as follows:

- **H** (Heavy) aircraft types of 136 000 kg (300 000 lb) or more;
- **M** (Medium) aircraft types less than 136 000 kg (300 000 lb) and more than 7 000 kg (15 500 lb); and
- **L** (Light) aircraft types of 7 000 kg (15 500 lb) or less.
- *Note:* **Super Heavy** for Airbus A380-800 with a maximum take-off mass in the order of 560 000 kg.

Figure 14: Development of list of aircraft types with MTOM>5 700kg for CORSIA CO_2 emissions estimation tool development process

3.2.3 Development of ICAO CEMs based on aeroplane operator data (COFdb)

As described in the first step of the four-tier approach in Figure 13, if the aircraft type can be mapped to an aircraft type available from the CCG Operations and Fuel database (COFdb), an ICAO CEM is developed using statistical models.

Overview of the CCG Operations and Fuel database (COFdb)

The CAEP Working Group 4 (WG4) CCG Operations and Fuel database (COFdb) is a database of actual flights that includes: aircraft type, great circle distance (based on aerodrome of origin and destination), fuel burn, block time, and operation year for each flight.

Data contained in the COFdb comes from aeroplane operators who have voluntarily agreed to provide data for the development of the ICAO CORSIA CERT as per recommendation from Annex 16, Volume IV, Appendix 3. Given the commercial sensitivity of flight level fuel burn information, the COFdb is the result of a multi-step process used to ensure that data in the COFdb is anonymized i.e., that neither the aeroplane operator nor the individual flight can be identified from the COFdb data. Aeroplane operators provide relevant flight level data to DPO Data Providing Organizations (DPOs) who process the flight level data anonymizing it to remove references to the actual aeroplane operators and flight, assigning to it a unique code to allow traceability if needed, and provide it to the WG4-CCG co-leads for it to be integrated in the COFdb replacing the DPO unique code with a COFdb specific unique code. Once validated by the CCG co-leads, the resulting COFdb is shared only with WG4 CCG members and governed by a Use Agreement and for the sole purpose of supporting and facilitating the work of developing, validating, and maintaining the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) and the underlying ICAO CO_2 Estimation Models (CEMs).

Data collection and validation processes

When providing data to CAEP, DPOs are responsible for:

- validating, to the extent possible to the Organization, the correctness of the departure and arrival aerodrome as well as of the correct use of the ICAO aircraft type designator as per Doc 8643 for each flight having indeed been operated between those aerodromes, coordinating with the aeroplane operator as necessary;
- computing the Great Circle Distance, rounded to the kilometer, between the departure and arrival aerodrome, using the latitude and longitude of the aerodromes as provided in the applicable version of Doc 7910 (applicability determined on the basis of the date of flight and the date of issue of the ICAO Document) or applicable AIP information and with the Earth modelled according to the WGS84 reference system and geodetic datum; the Great Circle Distance field is to be left empty if either the departure or the arrival aerodrome is not available in Doc 7910;
- computing whether the flight is international or domestic on the basis of the departure and arrival aerodrome and in accordance with the prescriptions of Annex 16, Volume IV, Part II, Chapter 1, 1.1.2;
- including for each flight record a unique identifier per aircraft type, identifier which allows the DPO to identify the related flight data supplier in order to coordinate with the latter as and if required;
- ensuring that, when available, the block time is provided in minutes without decimals, leaving the field empty if not available;
- excluding from the provided data records for which:
    - the validation of the first point is unsuccessful; or
    - the aircraft type is not in the applicable version of Doc 8643 (applicability determined on the basis of the date of the flight and the date of issue of the ICAO Document); or
    - both the Great Circle Distance and the block time are unknown.

Integration of data into the COFdb (pre-verification)

Prior to integrating data received from a DPO into the COFdb, CAEP conducts a parallel and redundant process that includes (1) pre-verification of the COFdb in order to ensure the quality of the data as well as (2) accurate and appropriate data integration in the COFdb.

Verification and distribution of the COFdb

CAEP also conducts verification of the integrated COFdb, including checks that the data available in the received version of the COFdb is complete. The COFdb is then made available to each CAEP expert contributing to the development of the ICAO CORSIA CERT and that have executed a Use Agreement at the time of the distribution of the COFdb.

Version of the COFdb used for the 2025 version of the ICAO CORSIA CERT

For the 2025 version of the ICAO CORSIA CERT, the COFdb version 2025_1.0 as of February 26, 2025 was used. This 2025 version 1.0 of the COFdb includes data from approximately 7.6 million flights (after removal of older data) for 136 aircraft types by ICAO Type Designator. Data ranged from 2006 to 2025 with about 90% of the data coming from 2017 to 2025.

Identifying and removing outliers from aeroplane operator's raw data

Before final regression models were developed for each of the aircraft type, outliers were identified and removed. To identify outliers, a first regression on the entire dataset is developed. This allows the calculation of the standardized residual absolute value for all data points. As an initial step, data points with a standardized residual absolute value greater than 3σ were identified as outliers and were examined. For each aircraft type and regressions, CCG evaluated the fitness of the 3σ criterion for the given dataset. If deemed appropriate, the default 3σ criterion was used. For a few aircraft types, 4σ or 5σ were used to better capture the distribution of flights across the dataset. Once outliers were removed, single or multi-segment regressions were developed.

Regression model selection and development

The ICAO CEMs are based on piece-wise linear fuel burn vs. GCD or block time functions. The dependent variable is fuel burn. There are two potential explanatory variables in the model: (1) Block Time or (2) Great Circle Distance (GCD) of the flight. The 2019 version of the ICAO CORSIA CERT and subsequent versions include both Great Circle Distance and Block Time input.

Figure 15 shows an illustration for a sample aircraft type with the COFdb data split into data retained for the development of the regression i.e., ICAO CEM (in green) and outliers (in red).

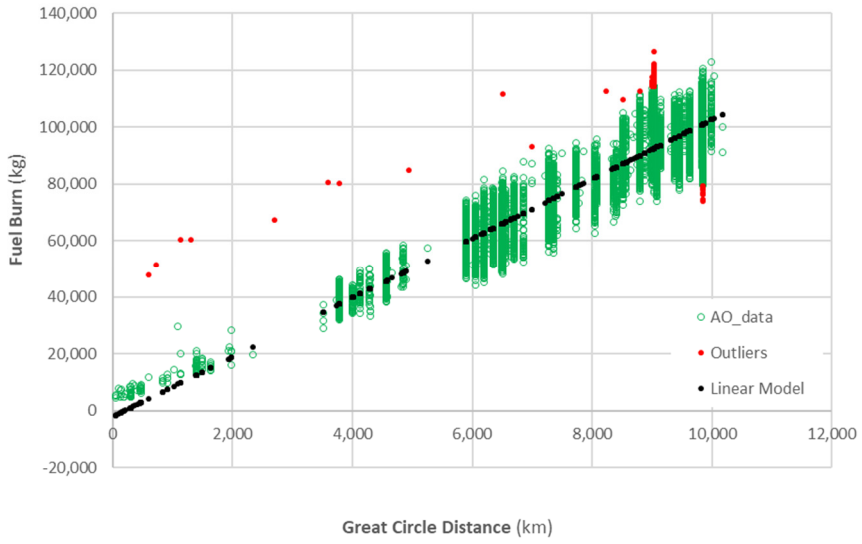


Figure 15: Illustration of sample data used to generate ICAO CEMs, including outlier data removed from the process of generating the ICAO CEM

To generate an ICAO CEM, the CCG followed the following steps:

- Import an aircraft type database;
- Generate a regression on entire dataset (i.e., linear OLS model);
- Identify outliers and remove them; and
- Run a second single-segment regression or a piece-wise regression (up to three segments with breakpoints).

If breakpoints are not used on some aircraft types, uncorrected linear regression ICAO CEMs may result in negative intercept. Piecewise linear equations are used to address this and better represent the dataset. The need for breakpoints was determined using the following rules:

- If there is a negative intercept -> introduce a breakpoint;
- If there is a cluster consistently above or below -> introduce a breakpoint; and
- If there is a Great Circle Distance (GCD) gap -> potentially introduce breakpoints.

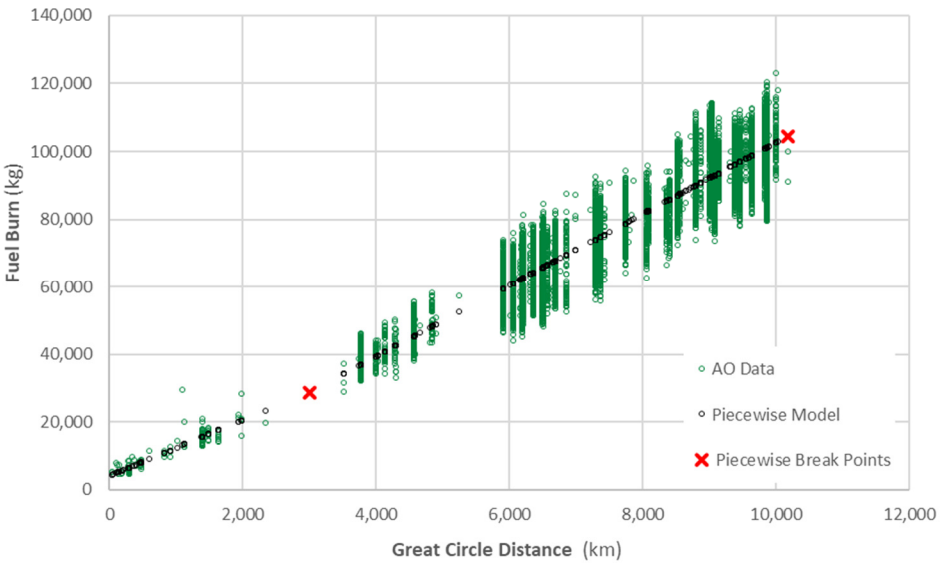


Figure 16: Illustration of fuel burn statistical method model formulation (GCD Model)

3.2.4 Development of ICAO CEMs based on equivalent aircraft types

If the aircraft type is not available in the COFdb but can be mapped to an equivalent aircraft type within the same family (and same manufacturer), an ICAO CEM is developed through scaling of the ICAO CEM of the equivalent aircraft type.

The development of equivalent aircraft type model was only allowed for aircraft within the same family (and same aeroplane manufacturer) if deemed appropriate. For example, an Airbus A342 was deemed equivalent to an Airbus A343 for which an ICAO CEM based on data from the COFdb was available.

Once equivalent aeroplane are identified, the ICAO CEM was adjusted by scaling (multiplying) it using a Mass ratio of the Average Operating MTOM of both aircraft types:

$$\text{MTOM ratio factor} = \frac{\text{Avg. MTOM}_{\text{aeroplane not in COFdb}}}{\text{Avg. MTOM}_{\text{equivalent aeroplane in the COFdb}}}$$

Data from a global registration database was used to develop Average MTOM values for each aircraft types in the ICAO CORSIA CERT aeroplane database.

3.2.5 ICAO CEMs based on ICAO Fuel Formula

If the aircraft type is not mapped to the COFdb or equivalent aircraft type, then the ICAO Fuel Formula is re-used.

Additional information on the ICAO Fuel Formula used in the ICAO Carbon Calculator is available at ICAO Carbon Emissions Calculator Methodology Version 10, https://www.icao.int/environmental-protection/CarbonOffset/Documents/Methodology%20ICAO%20Carbon%20Calculator_v10-2017.pdf

3.2.6 Development of ICAO CEMs based on generic equation model

Finally, to allow the estimation of fuel burn and CO_2 emissions for an aircraft type that is missing an ICAO CEM after applying the steps in 3.2.3 to 3.2.5, a set of generic equation models are developed from which an ICAO CEM for such aircraft type can then be derived. This step forms the basis for the ICAO CORSIA CERT functionality of entering custom aeroplane that can either be (1) one of the aircraft types identified in Appendix A-1, Table A-1.2.d or (2) an aircraft type not included in Doc 8643 that a user may need to enter and use towards the estimation of its emissions. For each linear regression-based model the fuel is calculated on specific distances. Those are determined to ensure a sufficient level of granularity and account for the possible variation of the piecewise breakpoints.

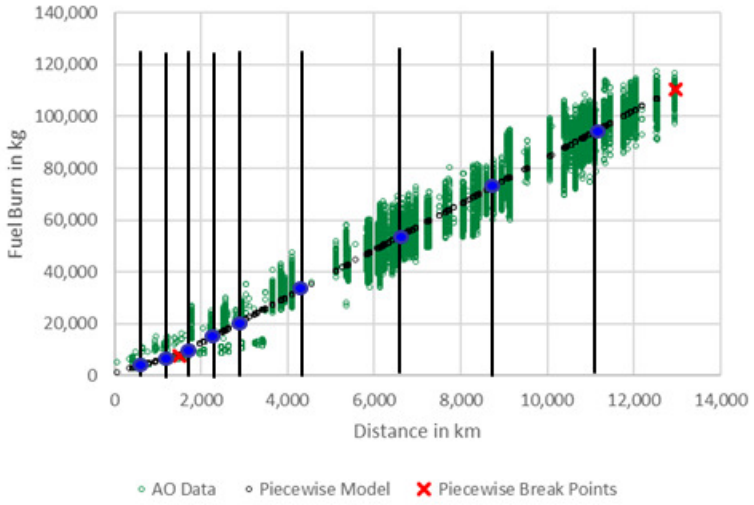


Figure 17: Illustration of process for binning data for developing generic equation

For each distance band value the calculated fuel are reported versus the aeroplane average Maximum Take-off Mass (MTOM). To develop generic equation models most representative, aircraft types are grouped by category including:

- Heavy Jets[4];
- Medium Jets with Certified MTOM greater than 60 000 kg[5];
- Medium Jets with Certified MTOM lower or equal to 60 000 kg; and
- Turboprops and Turboshaft aeroplane.

Figure 18 illustrates the development of generic aeroplane (fuel burn) values (in orange) for a given distance within the category of Medium Jets with Certified MTOM greater than 60 000 kg based on values from the ICAO CEMs (in blue) for aeroplane in the same category. Distances of 0 km and 1 000 km are shown for illustration.

[4] Heavy Jets, Medium Jets, Turboprops and Turboshaft powered aircraft based on categorization included in Doc 8643.

[5] The Medium Jets category was split into two subcategories to capture different trends across the broad MTOM range from approximately 10 tonnes to approximately 120 tonnes. A breakpoint at 60 tonnes was established as it captures trends appropriately. In addition, the 60 tonnes thresholds leverages and is consistent with the ICAO CO_2 emissions standard (governed by Annex 16, Volume III) that includes a breakpoint at 60 tonnes certified MTOM.

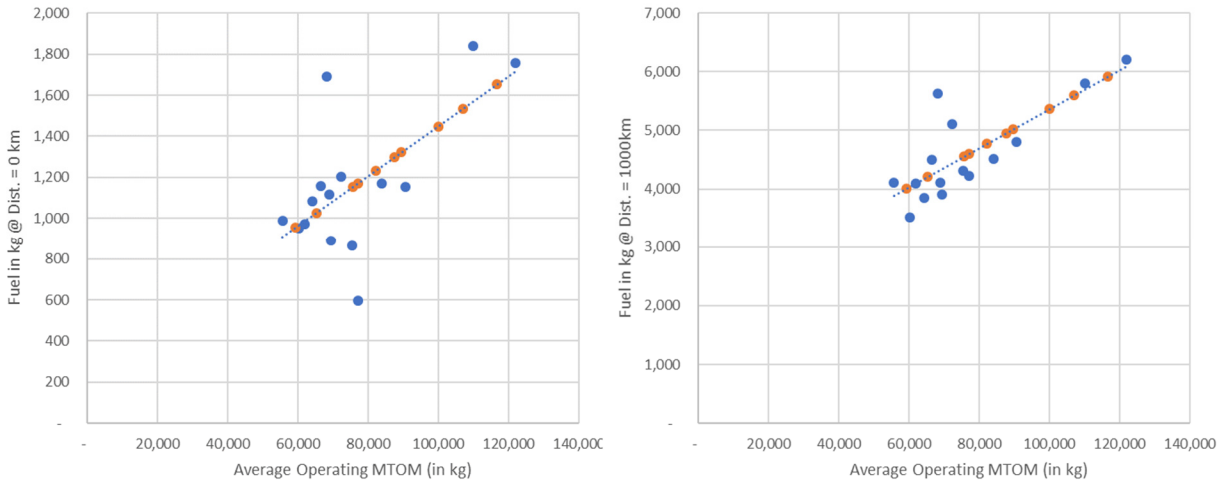


Figure 18: Illustration of generic aeroplane fuel burn-MTOM based regressions for a given distance

Similarly to aeroplane operator fuel burn data, a linear regression is then calculated. The result is a set of equations (per aeroplane category and distance band) returning a fuel as a function of the aeroplane maximum take-off mass. As based on that set of equations, a fuel estimation model (equation) can be derived for any aircraft type (Figure 11).

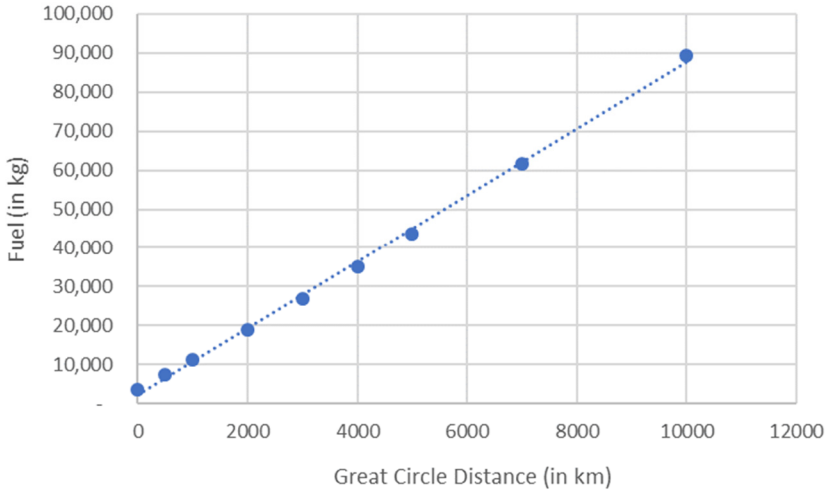


Figure 19: Illustration of generic aeroplane ICAO CEM

4. IMPLEMENTATION OF THE ICAO CORSIA CERT: VERSION 2025

ICAO CORSIA CERT has been developed, tested, and validated on Microsoft Excel 2013 and Windows 11 as Operating System. This should not be considered the minimum possible configuration. However, due to possible compatibility issues with older Excel versions and/or operating systems other than those tested, it is recommended to use Windows 7 or higher and Excel version 2010 or later. ICAO CORSIA CERT has not been tested on any MAC OS.

The ICAO CORSIA CERT version 2025 -includes two key functionalities:

a) Summary of assessment of applicability of CORSIA and eligibility to use the ICAO CORSIA CERT in 2025,

b) CO_2 Estimation and Reporting for 2026.

4.1 Summary of assessment of applicability of CORSIA and eligibility to use the ICAO CORSIA CERT in 2025

The ICAO CORSIA CERT version 2025 takes the user through a simple three steps process where the user:

(1) Enters aeroplane operator information relevant for assessing the applicability of CORSIA and eligibility to use the ICAO CORSIA CERT for monitoring and reporting of CO_2 emissions;

(2) Estimates its CO_2 emissions from international flights; and

(3) Generates a summary assessment of applicability of CORSIA and eligibility of the aeroplane operator to use the ICAO CORSIA CERT, with the possibility to generate documents to save them for record keeping.

4.1.1 Aeroplane operator identification

To allow for the identification of the aeroplane operator on the summary documents, the user can enter key information on the aeroplane operator. The format of the required information is consistent with the identification page of the Emissions Monitoring Plan. This information is then used in the summary assessment and saved documents.

4.1.2 Calculation of CO_2 emissions

The core functionality of the ICAO CORSIA CERT is the estimation of CO_2 emissions based on user input data.

4.1.3 Loading and entering data into the ICAO CORSIA CERT

The user can enter aircraft type and flight information data into the ICAO CORSIA CERT using two key paths:

a) Manual entry by selecting an aircraft type designator from the list of types available in the ICAO CORSIA CERT aeroplane database. If needed, the user can also enter codes that are not included in the ICAO CORSIA CERT aeroplane database which become ‘custom aeroplane code’. See below for details on the custom aeroplane and aerodrome functionality in the ICAO CORSIA CERT; and

b) Direct upload into the ICAO CORSIA CERT by loading a file containing aircraft types, origin and destination aerodromes as well as number of flights. This file in csv format can be used as the interface between an aeroplane operator’s Operations and Flight Management System and the ICAO CORSIA CERT.

4.1.4 Comparison of the operations input data against the ICAO CORSIA CERT aeroplane and aerodrome databases

When loading operations data into the ICAO CORSIA CERT or calculating CO_2 emissions, the user can choose to compare the input aircraft type and aerodromes entries against the internal ICAO CORSIA CERT aeroplane and aerodromes databases. This comparison checks for consistency and returns any aircraft type code and aerodrome code that does not match the internal ICAO CORSIA CERT aeroplane and aerodromes databases. The user can then choose to enter custom aeroplane and aerodromes

information for these codes or return to the input data and correct the codes if an error was made in the data entry.

Entering custom aeroplane codes

If the user chooses to use custom aeroplane codes, he/she is prompted to select an aircraft category from the following list:

a) Jet (Heavy) with certified MTOM ≥136 000 kg;

b) Jet with certified MTOM ≥ 60 000 kg and < 136 000 kg;

c) Jet with certified MTOM < 60 000 kg; and

d) Turboprop.

The user is also prompted to enter the Average Maximum Take Off Mass (MTOM) in the aeroplane operator fleet. The Average MTOM is calculated using the arithmetical average of individual MTOMs of aeroplane in the fleet of a given aircraft type code. The individual MTOMs are the individual maximum permissible take-off mass of each individual aeroplane according to the certificate of airworthiness, the flight manual or other official documents as defined by ICAO Annex 16, Volume IV.

Based on the aeroplane category selected and the Average Maximum Take Off Mass (MTOM) in the aeroplane operator fleet, the ICAO CORSIA CERT derives a tailored ICAO CEM from the relevant generic equation model according to the approach described in section 3.2.6. The custom aeroplane functionality displays information on the fuel burn rate (kg/km) and intercept value (fuel at great circle distance of 0 km) depending on the underlying regression model associated with a manually selected aeroplane category and average MTOM. The indicated fuel burn rate and interception value are used within ICAO CORSIA CERT to calculate the estimated fuel and emissions for all flights with this Custom Aeroplane Code.

The following coefficients are used in the 2025 version of the ICAO CORSIA CERT to generate generic equations (as a function of entered Average MTOM) for aircraft types entered as custom aeroplane, by aircraft type category.

Aircraft Type Category	Coefficients for Linear Function to Derive the **Intercept** of the Generic Equation		Coefficients for Linear Function to Derive the **Slope** of the Generic Equation	
Coefficients for Generic Equation based on Great Circle Distance (i.e., Fuel = slope * GCD + intercept)				
	Intercept	Slope	Intercept	Slope
Jet (Heavy) with certified MTOM >= 136 000 kg	-1612.781888	0.015321932	0.827247466	2.59421E-05
Jet with certified MTOM >= 60 000 kg and < 136 000 kg	62.85873027	0.012244668	1.076300863	2.89373E-05
Jet (Heavy) with certified MTOM < 60 000 kg	203.2651212	0.01365883	0.156791049	5.14031E-05
Turboprop	-16.80054575	0.013612183	0.343472976	4.70303E-05
Coefficients for Generic Equation based on Block Time (i.e., Fuel = slope * Block_Time + intercept)				
	Intercept	Slope	Intercept	Slope
Jet (Heavy) with certified MTOM >= 136 000 kg	3938.704283	-0.030494321	-2.67212795	0.000443202
Jet with certified MTOM >= 60 000 kg and < 136 000 kg	695.5385432	-0.011284349	4.927462713	0.000482265
Jet (Heavy) with certified MTOM < 60 000 kg	38.85451795	0.001553227	3.740635486	0.000547453
Turboprop	34.13816212	0.001871575	0.117957948	0.000482061

Figure 20: Coefficients used in the 2025 version of the ICAO CORSIA CERT to generate generic equations (as a function of entered Average MTOM) for aircraft types entered as custom aeroplane

Note. - If custom aircraft types are entered but already exist in the ICAO CORSIA CERT aeroplane database, the information in the ICAO CORSIA CERT aeroplane database will anyhow be used as default for calculating CO_2 emissions.

CERT Aerodrome Database

The CERT Aerodrome database contained in the 2025 version of the CERT is based on the Edition 192 of the ICAO eDoc7910. Some aerodromes contained in ICAO eDoc 7910 with latitude and longitude in erroneous formats were addressed for the purpose of the development of the CERT Aerodrome database. The CERT aerodrome database also includes a short list of aerodromes that complement the subset of aerodromes from ICAO eDoc7910. Appendix C contains the short list of aerodromes to be added to the CERT Aerodrome database underlying the CERT 2025.

These aerodromes or any aerodromes contained in the CERT aerodrome database can be overwritten by users following the procedure described in the next section.

Entering custom aerodrome codes

If needed, the user can enter custom aerodrome codes in order to allow for the calculation of CO_2 emissions for each flight entered. The user is prompted to enter aerodrome latitude using WGS84 coordinates. In the 2025 version of the ICAO CORSIA CERT, the user has greater flexibility for entering aerodrome coordinates. The separation symbols can be defined by the user.

Latitude and longitude pairs for aerodromes or Aerodrome Reference Points (ARP) within the ICAO CORSIA CERT shall be used with the following Latitude & Longitude sign convention.

A negative latitude (-) means South of the Equator. A negative longitude (-) means West of the Prime Meridian.

In addition, the user is prompted to enter an ICAO Member State attributed to the aerodrome by selecting from the list of 193 ICAO Member States as of April 2020. In order to help with the attribution of aerodromes to ICAO Member States, the ICAO CORSIA CERT provide a suggestion on a potential ICAO Member State based on the first two letters of the Custom Aerodrome Code (for codes with four letters only).

Note. - If custom aerodromes are entered but already exist in the ICAO CORSIA CERT aeroplane database, the information for the custom aerodromes will be used as default for the purpose of calculating CO_2 emissions.

Note. – In order to help the user search the ICAO CORSIA CERT aeroplane and aerodrome databases, a search functionality was developed. Additional information on the underlying Doc 8643 can be found at: https://www.icao.int/publications/DOC8643/Pages/default.aspx. In addition, additional information on Doc 7910 can be found at https://gis.icao.int/7910FLEX/.

4.1.5 Computation of Great Circle Distance

For each aerodrome pair entered as input into the tool, the ICAO CORSIA CERT calculates a Great Circle Distance (GCD).

Doc 7910 was used as the basis for the aerodrome latitudes and longitudes. The input latitude and longitude is based on WGS84. In order to compute Great Circle Distance used as input to the ICAO CORSIA CERT underlying ICAO CEMs, the Vincenty's Method was used and implemented in the ICAO CORSIA CERT. The Vincenty's method is an iterative process used in geodesy to calculate the distance between two points on the surface of a spheroid, developed by Thaddeus Vincenty (1975a). It is based on the assumption that the figure of the Earth is an oblate spheroid, and hence is more accurate than methods that assume a spherical Earth, such as Great Circle Distance. The method is widely used in geodesy because they are accurate to within 0.5 mm (0.020″) on the Earth ellipsoid.

4.1.6 Generation of a summary assessment of CO_2 emissions

After ensuring that the entered information is complete and calculating CO_2 emissions, the user can generate a summary assessment of applicability of Annex 16, Volume IV, Chapter 2 and eligibility to use the ICAO CORSIA CERT in 2025.

The summary assessment includes:

a) **Aeroplane operator information** based on input from the user;

b) **Estimated CO_2 emissions and status of aeroplane operator.** This comprises:

- Total annual estimated CO_2 emissions (international). It should be noted that emissions are for all international State pairs. For the 2025 version of the ICAO CORSIA CERT, this total splits between State pairs with offsetting requirements and State pairs not subject to offsetting requirements (see Annex 16, Volume IV, Chapter 3 for details).
- Total annual estimated CO_2 emissions (domestic). Domestic aviation is outside the scope of applicability of Annex 16, Volume IV. Information is provided for awareness of tool user in the event domestic flights are entered in the input tables.
- Status of aeroplane operator as to whether the aeroplane operator falls under the scope of applicability of CORSIA as per Annex 16, Volume IV, Chapter 2 and whether the aeroplane operator is eligible to use the ICAO CORSIA CERT or required to use one of the five Fuel Use Monitoring Methods. For details on Fuel Use Monitoring Methods refer to Annex 16, Volume IV, Chapter 2 and Appendix 2 and the Environmental Technical Manual (Doc 9501), Volume IV.

c) **Detailed estimated CO_2 emissions by State pairs.**

4.1.7 Generation of report on summary assessment

To support the Emissions Monitoring Plan (EMP) in 2025, the aeroplane operator can use the ICAO CORSIA CERT to estimate its emissions. The ICAO CORSIA CERT can produce a copy summary assessment along with a copy of the Appendix to the summary assessment containing the custom aeroplane and aerodromes information (if entered in the tool).

The user can save a copy for its records. In accordance with Annex 16, Volume IV, Appendix 4, 2.3.1.1 a) on the supporting information on methods and means for calculating emissions from international flights, the aeroplane operator can submit a copy of the summary assessment to its State along with the Emissions Monitoring Plan.

4.2 CO_2 Estimation and Reporting for 2025

The CO_2 Estimation and Reporting functionality of the ICAO CORSIA CERT version 2025 takes the user through each step of the Emissions Report generation process where the user:

a. Enters aeroplane operator identification and description of activities,

b. Enters underlying basic information of the Emissions Report,

c. Enters aeroplane fleet and fuel types

d. Select Fuel density

e. Selected the level of aggregation of the information reported,

f. Load its operations (and fuel) data to estimation CO_2 emissions,

g. Completes the prefilled “Reporting - State pairs” report, or

h. Completes the prefilled “Reporting - Aerodrome pairs”, and

i. Completes the prefilled “Data gaps” information.

j. Review the Emissions Report and Export the Emissions Report in various formats to meet the need of the aeroplane operator.

The following section provides additional information on each of the steps and the associated underlying methodologies and assumptions.

4.2.1 Starting to Fill the Emissions Report

If the ICAO CORSIA CERT is used to fill an Emissions Report, the user will be prompted to enter information on (1) Aeroplane operator identification and description of activities, (2) Underlying basic information of the Emissions Report, (3) Aeroplane fleet and fuel types, (4) Fuel density and (5) Level of aggregation of the information reported.

The ICAO CORSIA CERT replicates the same process and format as the ICAO Emissions Report template.

4.2.2 Loading and entering data into the ICAO CORSIA CERT

In order to estimate fill the relevant portions of the Emission Report, the ICAO CORSIA CERT will estimate CO_2 emissions and fill data gaps (as needed). The first step is to load or enter data into the ICAO CORSIA CERT. An aeroplane operator can enter aircraft type and flight information data into the ICAO CORSIA CERT using two key paths:

a) Manual entry by selecting an aircraft type designator from the list of types available in the ICAO CORSIA CERT aeroplane database. If needed, the user can also enter codes that are not included in the ICAO CORSIA CERT aeroplane database which become ‘custom aeroplane code’. See section 4.2.3 for details on the custom aeroplane and aerodrome functionality in the ICAO CORSIA CERT; and

b) Direct upload into the ICAO CORSIA CERT by loading a file containing aircraft types, origin and destination aerodromes as well as number of flights. This file in .csv format can be used as the interface between an aeroplane operator’s Operations and Flight Management System and the ICAO CORSIA CERT.

4.2.3 Comparison of the operations input data against the ICAO CORSIA CERT aeroplane and aerodrome databases

When loading operations data into the ICAO CORSIA CERT or calculating CO_2 emissions, the user can choose to compare the input aircraft type and aerodromes entries against the internal ICAO CORSIA CERT aeroplane and aerodromes databases. This comparison checks for consistency and returns any aircraft type code and aerodrome code that does not match the internal ICAO CORSIA CERT aeroplane and aerodromes databases. The user can then choose to enter custom aeroplane and aerodromes information for these codes or return to the input data and correct the codes if an error was made in the data entry.

Entering custom aeroplane codes

If the user chooses to use custom aircraft type codes, he/she is prompted to select an aeroplane category from the following list:

a) Jet (Heavy) with certified MTOM ≥ 136 000 kg;

b) Jet with certified MTOM ≥ 60 000 kg and < 136 000 kg;

c) Jet with certified MTOM < 60 000 kg; and

d) Turboprop.

The user is also prompted to enter the Average Maximum Take Off Mass (MTOM) in the aeroplane operator fleet. The Average MTOM is calculated using the arithmetical average of individual MTOMs of aeroplane in the fleet of a given aeroplane code. The individual MTOMs are the individual maximum permissible take-off mass of each individual aeroplane according to the certificate of airworthiness, the flight manual or other official documents as defined by ICAO Annex 16, Volume IV.

Based on the aeroplane category selected and the Average Maximum Take Off Mass (MTOM) in the aeroplane operator fleet, the ICAO CORSIA CERT derives a tailored ICAO CEM from the relevant generic equation model according to the approach described in section 3.2.6. The custom aeroplane functionality displays information on the fuel burn rate (kg/km) and intercept value (fuel at great circle distance of 0 km) depending on the underlying regression model associated with a manually selected aeroplane category and average MTOM. The indicated fuel burn rate and interception value are used within ICAO CORSIA CERT to calculate the estimated fuel and emissions for all flights with this Custom Aeroplane Code.

The following coefficients are used in the 2025 version of the ICAO CORSIA CERT to generate generic equations (as a function of entered Average MTOM) for aircraft types entered as custom aeroplane, by aircraft type category.

Aircraft Type Category	Coefficients for Linear Function to Derive the **Intercept** of the Generic Equation		Coefficients for Linear Function to Derive the **Slope** of the Generic Equation	
Coefficients for Generic Equation based on Great Circle Distance (i.e., Fuel = slope * GCD + intercept)				
	Intercept	Slope	Intercept	Slope
Jet (Heavy) with certified MTOM >= 136 000 kg	-1664.869276	0.01527618	0.955725671	2.54277E-05
Jet with certified MTOM >= 60 000 kg and < 136 000 kg	100.5100799	0.011693273	1.053862628	2.91411E-05
Jet (Heavy) with certified MTOM < 60 000 kg	204.6994483	0.013666443	0.157986645	5.12399E-05
Turboprop	-12.97214409	0.013127282	0.337285445	4.77165E-05
Coefficients for Generic Equation based on Block Time (i.e., Fuel = slope * Block_Time + intercept)				
	Intercept	Slope	Intercept	Slope
Jet (Heavy) with certified MTOM >= 136 000 kg	3756.904256	-0.030431816	-0.617065586	0.000435849
Jet with certified MTOM >= 60 000 kg and < 136 000 kg	702.0216567	-0.011410619	4.825632398	0.000483445
Jet (Heavy) with certified MTOM < 60 000 kg	23.6098985	0.002002471	4.078066337	0.000534298
Turboprop	33.38052469	0.001952939	0.142480231	0.000480079

Figure 21: Coefficients used in the 2025 version of the ICAO CORSIA CERT to generate generic equations (as a function of entered Average MTOM) for aircraft types entered as custom aeroplane

Note. - If custom aircraft types are entered but already exist in the ICAO CORSIA CERT aeroplane database, the information in the ICAO CORSIA CERT aeroplane database will anyhow be used as default for calculating CO_2 emissions.

Entering custom aerodrome codes

Note. – The Custom Aerodrome functionality for the "CO_2 Estimation and Reporting for 2025" functionality is identical to the Custom Aerodrome functionality for the "Summary of assessment of applicability of CORSIA and eligibility to use the ICAO CORSIA CERT in 2025". See section 4.1.4 for details.

4.3 Data entry error and plausibility of input data

The ICAO CORSIA CERT 2025 version also includes a number of functionality that allows the user to identify potential data entry errors and confirm the accuracy of the input data, including;

- **Date;** Date is an Optional Field. When importing an Input File and/or Calculating CO_2 Emissions, the ICAO CORSIA CERT checks that the year of the entered date matches the Reporting Year (as described in "2 Underlying basic information of the Emissions Report" section a) of the Emissions Report). Warning messages are displayed as "Date" in the last column (i.e., "Warnings") of the input/output table.
- **ICAO Aircraft Type Designator availability;** The tool will prompt the user to check the aircraft type designator against the underlying ICAO CORSIA CERT Aeroplane database and the Custom Aeroplane entered by the user. If any discrepancies are found, the user will be prompted to update/edit existing Custom Aircraft Types or enter new ones,
- **Origin Aerodrome and Destination Aerodrome availability**; Similar to the aircraft type input, the tool will prompt the user to check the origin and destination aerodromes against the underlying ICAO CORSIA CERT Aerodrome database and the Custom Aerodromes entered by the user. If any discrepancies are found, the user will be prompted to update/edit existing Custom Aerodromes or enter new ones.
- **"Total Number of Flights" valid input checks**; The tool will check that input values of total number of flights for flight entries are; (1) greater or equal to 0, (2) integer values (i.e., not fractions of flights). If errors are identified, a pop up message will appear and flight entries will be highlighted.
- **Type of Fuel valid input checks;** The tool will check that a correct Type of Fuels (i.e., Jet-A, Jet-A1, Jet-B, AvGas) are entered. It should be noted that the Type of Fuel selected can include equivalent fuels. If discrepancies between input data and acceptable Type of Fuels are identified, the tool will return an error message and the flight entries with errors will be highlighted.
- **Great Circle Distance comparison with Aeroplane Type's Potential Max Range;** For each of the flight entries for which Great Circle Distance (GCD) was computed, the tool will also compare the GCD to a Maximum Range for the associated aircraft type. If the GCD exceeds this maximum range, a warning will be return. It should be noted that this comparison and possible warning are for information only. The intent is to identify potential input errors (e.g., order of magnitude error such as 0 added to input data). The warning can also result from normal operations if longer range versions of the aeroplane are operated.
- **Estimated and/or Reported Fuel comparison with Aeroplanes Maximum Fuel Tank Capacity;** For each of the flight entries, the tool will identify cases where average reported and/or estimated fuel (and resulting CO_2 emissions) per flight exceed the ICAO CORSIA CERT default maximum fuel tank capacity value for that ICAO Aircraft Type and/or Custom aeroplane code. In order to avoid a possible overestimation of CO_2 emissions, the user is prompted to check the following flight entries flagged with "Fuel Cap". It should be noted that this warning message may be ignored since individual maximum fuel tank capacity and fuel tank configuration can differ from the ICAO CORSIA CERT default values (e.g., some aeroplanes can have additional fuel tanks which could be one explanation). It should be noted that this comparison and possible

warning are for information only. The intent is to identify potential input errors (e.g., order of magnitude error such as 0 added to input data).

4.4 Calculation of CO_2 emissions

4.4.1 The ICAO CORSIA CERT 2025 version builds on the 2024 version with regard to the input of aeroplane operator information, the CO_2 estimation and the generation of a summary assessment functionalities. To meet requirements from Annex 16 Volume IV Chapters 2 and 3, the CERT 2025 embeds the CORSIA Implementation Element titled as "CORSIA States for Chapter 3 State Pairs" that will be used to determine the CO_2 emissions subject to offsetting requirements in 2025. The second edition (revision 1) version (September 2021) of CORSIA Implementation Element titled as "CORSIA States for Chapter 3 State Pairs" is available on the CORSIA website6. This document includes the list of 115 States that participate in CORSIA from 1 January 2025. The CCG developed functionality to embed this list in the CERT 2025 and scripts to calculate and report CO_2 emissions subject to offsetting requirements into the Emissions Report (ER) template.

4.4.2 Generation of Emissions Report (5.1 Reporting - State Pairs and 5.2 Reporting - Aerodrome Pairs, 6 Data Gaps)

After ensuring that the entered information is complete and calculating CO_2 emissions and based on the selection in "5 Reporting" (i.e., reporting on a State pair level or reporting on an aerodrome pair level), the user can fill the portion of the Emissions Report template with statistics on number of flights, emissions, data gaps, etc.

The sections of the Emissions Report automatically and partially filled by the ICAO CORSIA CERT include:

a) **5.1 Reporting at State Pair Level.** This comprises:

- Total annual measured and/or estimated CO_2 emissions (international). It should be noted that emissions are for all international State pairs. For the 2025 version of the ICAO CORSIA CERT, this total splits between State pairs with offsetting requirements and State pairs not subject to offsetting requirements (see Annex 16, Volume IV, Chapter 3 for details).
- Total annual number of flights during the reporting period (international). It should be noted that flights are for all international State pairs. For the 2025 version of the ICAO CORSIA CERT, this total splits between State pairs with offsetting requirements and State pairs not subject to offsetting requirements (see Annex 16, Volume IV, Chapter 3 for details).
- The user can manually enter the Total emissions reductions claimed from the use of CORSIA eligible fuels.
- If the ICAO CORSIA CERT is used for data gap filling and actual fuel quantities (based on one of the five Fuel Use Monitoring Methods) are used, the break down will be automatically calculated by the ICAO CORSIA CERT and presented in section b).
- The user can manually enter the details of emissions reductions claimed from the use of CORSIA eligible fuels.
- Based on input and calculations in the "CO_2 Emissions Estimation & Data Gap Filling" section, the ICAO CORSIA CERT automatically generated the list of State Pairs including; State of departure, State of arrival, whether the CO_2 emissions were estimated by the ICAO

[6] Reference: ICAO document, "CORSIA States for Chapter 3 State Pairs", Version September 2024, available at: https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20States%20for%20Chapter%203%20State%20Pairs_5Ed_rev_web.pdf, last retrieved on August 20th, 2025.

CORSIA CERT, total number of flights, fuel type, total mass of fuel, fuel conversion factors, total CO_2 emissions. In the 2025 version, the ICAO CORSIA CERT indicates whether the State Pair is subject to offsetting requirements.

b) **5.2 Reporting at Aerodrome Pair Level.** This comprises:

- Total annual measured and/or estimated CO_2 emissions (international). It should be noted that emissions are for all international State pairs. For the 2025 version of the ICAO CORSIA CERT, this total splits between State pairs with offsetting requirements and State pairs not subject to offsetting requirements (see Annex 16, Volume IV, Chapter 3 for details).
- Total annual number of flights during the reporting period (international). It should be noted that flights are for all international State pairs. For the 2025 version of the ICAO CORSIA CERT, this total splits between State pairs with offsetting requirements and State pairs not subject to offsetting requirements (see Annex 16, Volume IV, Chapter 3 for details).
- The user can manually enter the Total emissions reductions claimed from the use of CORSIA eligible fuels.
- If the ICAO CORSIA CERT is used for data gap filling and actual fuel quantities (based on one of the five Fuel Use Monitoring Methods) are used, the break down will be automatically calculated by the ICAO CORSIA CERT and presented in section b).
- The user can manually enter the details of emissions reductions claimed from the use of CORSIA eligible fuels.
- Based on input and calculations in the "CO_2 Emissions Estimation & Data Gap Filling" section, the ICAO CORSIA CERT automatically generates the list of Aerodrome Pairs including; ICAO aerodrome code and State for the Departure, ICAO aerodrome code and State for the Arrival, whether the CO_2 emissions were estimated by the ICAO CORSIA CERT, total number of flights, fuel type, total mass of fuel, fuel conversion factors, total CO_2 emissions. In the 2025 version, the ICAO CORSIA CERT indicates whether the Aerodrome Pair is subject to offsetting requirements.

c) **6 Data Gaps.** This comprises:

- Based on input and calculations in the "CO_2 Emissions Estimation & Data Gap Filling" section, the ICAO CORSIA CERT automatically assesses whether data gaps occurred during the reporting year and whether the threshold of 5 per cent for data gaps was exceeded and reports the percent of data gaps. The 2025 version of the ICAO CORSIA CERT follows the requirements from Annex 16 Volume IV, where starting in 2021, the percentage of data gaps are calculated by dividing the total number of flights subject to offsetting requirements with data gaps by total number of international flights subject to offsetting requirements.

  Note. – In the 2019 and 2020 versions of the ICAO CORSIA CERT, the percentage of data gaps were calculated by dividing total number of flights with data gaps by total number of international flights.

- The user can manually enter the details on the data gaps if the 5 per cent threshold has been exceeded in the reporting year.

4.5 Exporting copies of the Emissions Report and Generation of Log of Assumptions

To support the Emissions Reporting (ER) in 2025, the aeroplane operator can use the ICAO CORSIA CERT to estimate its emissions and generate a filled version of the Emissions Report.

The ICAO CORSIA CERT can export and produce a copy of the Emissions Report in Excel Format (i.e., as a stand-alone version of the Emissions Report).

The ICAO CORSIA CERT can also generate (if needed and/or for purposes of record keeping) a time stamp pdf version of the Emissions Report. The user can save a copy for its records.

In addition, the ICAO CORSIA CERT returns a Log of Assumptions containing general information as well as the Custom aeroplane and Custom aerodrome information (if entered in the tool).

In accordance with Annex 16, Volume IV, Appendix 4, 2.3.1.1 a) on the supporting information on methods and means for calculating emissions from international flights, the aeroplane operator can submit a copy of the Log of Assumptions to its State along with the Emissions Report.

For purpose of tools interfaces (if needed), the user can export a .csv file of the data contained in "CO_2 Emissions Estimation & Data Gap Filling". Similarly, the user can export a .csv file of the data contained in "Custom aeroplane information" and "Custom aerodrome information".

5. VALIDATION AND REVIEW OF THE ICAO CO_2 ESTIMATION MODELS (CEMS)

The work on the ICAO CO_2 Estimation Models (CEMs), ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) and the associated development/maintenance documentation was led by the CAEP Working Group 4 (WG4). The CAEP Modeling and Database Group (MDG) subsequently conducted a validation exercise to ensure the ICAO CORSIA CERT was fit for purpose in terms of its use within CORSIA.

6. PHASED DEVELOPMENT OF THE ICAO CORSIA CERT AND FEEDBACK

The ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) can be used by an aeroplane operator to support the monitoring and reporting of their CO_2 emissions, in accordance with the requirements from ICAO Annex 16, Volume IV, Part II, Chapter 2, 2.2 and Appendix 3.

The ICAO CORSIA CERT supports aeroplane operators in fulfilling their monitoring and reporting requirements by populating the standardized Emissions Monitoring Plan and Emissions Report templates in Appendix 1 of the Environmental Technical Manual (Doc 9501), Volume IV – Procedures for demonstrating compliance with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). This support includes:

(i) assessing its eligibility to use Fuel Use Monitoring Methods in support of their Emissions Monitoring Plan (e.g. CO_2 emissions threshold requirements);

(ii) assessing whether or not it is within the applicability scope of Annex 16, Volume IV, Chapter 2 (MRV requirements); and

(iii) filling any CO_2 emissions data gaps.

6.1 Phased development of the ICAO CORSIA CERT and expected 2025 version

As described in section 2, the ICAO CORSIA CERT is expected to be valid for a given year to address the evolution of the required functionality of the ICAO CORSIA CERT in accordance with Annex 16, Volume IV.

In support of the recommendations from Annex 16, Volume IV, Appendix 3 on the collection of data to further develop and maintain the ICAO CO_2 Estimation Models (CEMs) used within the ICAO CORSIA CERT, Appendix A-2 shows the list of aeroplane that will be the focus of further and targeted data collection towards the 2025 version of the ICAO CORSIA CERT. Any operator and/or State willing to

contribute to the development of the ICAO CORSIA CERT and provide data is encouraged to contact ICAO-CAEP.

6.2 Process for providing feedback and input towards the future versions of the ICAO CORSIA CERT

Feedback on the ICAO CORSIA CERT functionalities or questions can be directed to CERT@icao.int

APPENDIX A-1: ICAO CO_2 Estimation Model (CEM) based on Great Circle Distance (GCD) Input in version 2025 of the ICAO CORSIA CERT

Table A-1.1.a. Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operator data from the COFdb

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
A124	An-124 Ruslan	Yes				
A306	A-300B4-600	Yes				
A310	A-310	Yes				
A332	A-330-200	Yes				
A333	A-330-300	Yes				
A339	A-330-900	Yes				
A343	A-340-300	Yes				
A346	A-340-600	Yes				
A359	A-350-900 XWB	Yes				
A388	A-380-800	Yes				
B744	747-400 (international, winglets)	Yes				
B748	747-8	Yes				
B762	767-200	Yes				
B763	767-300	Yes				
B764	767-400	Yes				
B772	777-200	Yes				
B773	777-300	Yes				
B77L	777-200LR	Yes				
B77W	777-300ER	Yes				
B788	787-8 Dreamliner	Yes				
B789	787-9 Dreamliner	Yes				
B78X	787-10 Dreamliner	Yes				
MD11	MD-11	Yes				
A20N	A-320neo	Yes				
A21N	A-321neo	Yes				
A318	A-318	Yes				
A319	A-319	Yes				
A320	A-320	Yes				
A321	A-321	Yes				
B38M	737 MAX 8	Yes				
B722	727-200	Yes				
B733	737-300	Yes				
B734	737-400	Yes				
B735	737-500	Yes				
B736	737-600	Yes				
B737	737-700	Yes				
B738	737-800	Yes				
B739	737-900	Yes				
B752	757-200	Yes				
B753	757-300	Yes				
BCS1	BD-500 CSeries CS100	Yes				
BCS3	BD-500 CSeries CS300	Yes				
E295	E195-E2	Yes				
MD82	MD-82	Yes				
MD88	MD-88	Yes				
MD90	MD-90	Yes				
B462	BAe-146-200	Yes				
B463	BAe-146-300	Yes				
B712	717-200	Yes				
C25B	525B Citation CJ3	Yes				
C25C	525C Citation CJ4	Yes				
C550	550 Citation 2	Yes				
C56X	560XL Citation Excel	Yes				
C68A	680A Citation Latitude	Yes				
C750	750 Citation 10	Yes				
CL30	BD-100 Challenger 300	Yes				
CL35	BD-100 Challenger 350	Yes				
CL60	CL-600 Challenger 650	Yes				
CRJ1	Regional Jet CRJ-100	Yes				
CRJ2	Challenger 800	Yes				

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-1.1.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operator data from the COFdb

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
CRJ7	Challenger 870	Yes				
CRJ9	Challenger 890	Yes				
CRJX	Regional Jet CRJ-1000	Yes				
DC95	DC-9-50	Yes				
E135	ERJ-135	Yes				
E145	ERJ-145EP	Yes				
E170	ERJ-170-100	Yes				
E190	ERJ-190 Lineage 1000	Yes				
E195	ERJ-190-200	Yes				
E290	E190-E2	Yes				
E35L	EMB-135BJ Legacy	Yes				
E45X	EMB-145XR	Yes				
E55P	EMB-505 Phenom 300	Yes				
E75L	ERJ-170-200 (long wing)	Yes				
F100	100	Yes				
F2TH	Falcon 2000	Yes				
F70	70	Yes				
F900	Falcon 900	Yes				
FA50	Falcon 50	Yes				
FA7X	Falcon 7X	Yes				
FA8X	Falcon 8X	Yes				
G280	Gulfstream G280	Yes				
GL5T	Global 5000	Yes				
GLEX	Global Express	Yes				
GLF4	Gulfstream 4	Yes				
GLF5	Gulfstream 5	Yes				
GLF6	Gulfstream G650	Yes				
H25B	Hawker 800	Yes				
LJ31	31	Yes				
LJ40	40	Yes				
LJ45	45	Yes				
LJ60	60	Yes				
LJ75	75	Yes				
RJ85	RJ-85 Avroliner	Yes				
AN26	An-26	Yes				
AT43	ATR-42-300	Yes				
AT45	ATR-42-500	Yes				
AT46	ATR-42-600	Yes				
AT72	ATR-72-201	Yes				
AT75	ATR-72-500	Yes				

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-1.1.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operator data from the COFdb

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
AT76	ATR-72-600	Yes				
B190	1900	Yes				
BE30	300 Super King Air	Yes				
D328	328	Yes				
DH8A	Dash 8 (100)	Yes				
DH8D	Dash 8 (400)	Yes				
F50	50 Maritime Enforcer	Yes				
SB20	2000	Yes				
SF34	SF-340	Yes				
MD87	MD-87	Yes				
C525	525 Citation CJ1	Yes				
C55B	550B Citation Bravo	Yes				
E75S	ERJ-170-200 (short wing)	Yes				
GA5C	Gulfstream G500 (G-7)	Yes				
GA6C	G-7 Gulfstream G600	Yes				
BE4W	Hawker 400XT	Yes				
GL7T	Global 7000	Yes				
AN72	An-72	Yes				
BE20	Super King Air (200)	Yes				
A225	An-225 Mriya	Yes				
AN22	An-22	Yes				
B350	King Air 350	Yes				
C25A	Citation Jet/M2	Yes				
C510	Citation Mustang	Yes				
C650	650 Citation 3	Yes				
C680	680 Citation Sovereign	Yes				
E50P	Phenom 100	Yes				
E545	EMB-545 Legacy 450	Yes				
E550	EMB-550 Legacy 500	Yes				
HDJT	HA-420	Yes				
PC24	PC-24	Yes				

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-1.1.b. Aircraft types (by ICAO type designator) modelled with equivalent aircraft types

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
A30B	A-300B2		Yes	A306		
A338	A-330-800		Yes	A339		
A342	A-340-200		Yes	A343		
A345	A-340-500		Yes	A346		
A35K	A-350-1000 XWB		Yes	A359		
B741	747-100		Yes	B744		
B742	747-200		Yes	B744		
B743	747-300		Yes	B744		
B74R	747SR		Yes	B744		
B74S	747SP		Yes	B744		
A19N	A-319neo		Yes	A20N		
B37M	737 MAX 7		Yes	B38M		
B39M	737 MAX 9		Yes	B38M		
B3XM	737 MAX 10		Yes	B38M		
MD81	MD-81		Yes	MD82		
MD83	MD-83		Yes	MD82		
B461	BAe-146-100		Yes	B462		
B732	737-200		Yes	B733		
C560	560 Citation 5		Yes	C550		
FA6X	Falcon 6X		Yes	FA7X		
GA7C	Gulfstream G700		Yes	GLF6		
H25A	HS-125-1		Yes	H25B		
H25C	Hawker 1000		Yes	H25B		
LJ25	25		Yes	LJ40		
LJ35	35		Yes	LJ40		
LJ55	55		Yes	LJ45		
LJ70	70		Yes	LJ45		
RJ1H	RJ-100 Avroliner		Yes	B463		
RJ70	RJ-70 Avroliner		Yes	RJ85		
AN30	An-30		Yes	AN26		
AN32	An-32		Yes	AN26		
AT73	ATR-72-211		Yes	AT72		
DH8B	Dash 8 (200)		Yes	DH8D		
DH8C	Dash 8 (300)		Yes	DH8D		
DHC7	DHC-7 Dash 7		Yes	DH8D		

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-1.1.c. Aircraft types (by ICAO type designator) modelled with ICAO Fuel Formula

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
DC10	DC-10					D10
DC85	DC-8-50					D8T
DC86	DC-8-60					D8L
DC87	DC-8-70					D8Q
IL62	Il-62					IL6
IL76	Il-76					IL7
IL86	Il-86					ILW
IL96	Il-96					IL9
L101	L-1011 TriStar					L10
B701	707-100					70M
B721	727-100					721
T134	Tu-134					TU3
T154	Tu-154					TU5
T204	Tu-204					T20
A148	An-148					A81
BA11	BAC-111 One-Eleven					B11
DC91	DC-9-10					D91
DC92	DC-9-20					D92
DC93	DC-9-30					D93
DC94	DC-9-40					D94
F28	F-28 Fellowship					F28
FA10	Falcon 10					DF2
J328	Dornier 328JET					FRJ
S601	SN-601 Corvette					NDC
WW24	1124 Westwind					WWP
YK40	Yak-40					YK4
YK42	Yak-42					YK2
A140	IRAN-140 Faraz					A40
A748	748					HS7
AN12	An-12					ANF
AN24	An-24					AN4
AN28	An-28					A28
ATP	ATP					ATP
BELF	SC-5 Belfast					SHB
C130	L-100 Hercules					LOH
C212	C-212 Aviocar					CS2
CN35	CN-235					CS5
CVLP	Convairliner					CVR
CVLT	Cosmopolitan					CV5
D228	Dornier 228					D28
DC3	DC-3					DC3
DC6	DC-6					DC6
DHC6	DHC-6 Twin Otter					DHT
E110	EMB-110 Bandeirante					EMB
E120	EMB-120 Brasilia					EM2
F27	F-27					F27
G159	G-159 Gulfstream 1					GRS
I114	Il-114					I14
IL18	Il-18					IL8
JS31	BAe-3100 Jetstream 31					J31
JS32	BAe-3200 Jetstream Super 31					J32
JS41	BAe-4100 Jetstream 41					J41
L188	Electra (L-188)					LOE
L410	L-410 Turbolet					L4T
N262	N-262 Frégate					ND2
SC7	SC-7 Skyliner					SHS
SH33	SD3-30					SH3
SH36	360					SH6
SW2	SA-26 Merlin 2					SWM
YS11	YS-11					YS1

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table format of ICAO CO_2 Estimation Models (CEMs) based on Great Circle Distance (GCD) Input in version 2025 of the ICAO CORSIA CERT

*Note: Tables provide fuel in kg. CO_2 emissions can be calculated using CO_2 (in kg) = 3.16 * Fuel (in kg).*

Table A-1.2.a. Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operators data from the COFdb

	Fuel (in kg) for given Great Circle Distance (in km)																
Type Designator	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000	10000
A124	6,784	14,997	23,210	31,423	39,636	47,849	56,062	64,054	71,027	78,000	84,973	91,946	98,919	112,865	126,811	140,757	154,703
A306	2,718	5,586	8,454	11,322	14,190	17,057	19,925	22,793	25,661	28,529	31,396	34,264	37,132	42,868	48,603	54,339	60,074
A310	1,527	4,399	7,271	10,144	13,016	15,888	18,760	21,632	24,504	27,376	30,248	33,120	35,992	41,736	47,480	53,224	58,969
A332	2,353	5,404	8,456	11,507	14,558	17,610	20,752	24,195	27,639	31,082	34,525	37,969	41,412	48,299	55,186	62,073	68,959
A333	2,202	5,986	9,768	13,146	16,525	19,904	23,283	26,631	29,938	33,246	36,554	39,861	43,169	49,784	56,400	63,015	69,631
A339	1,905	4,837	7,769	10,701	13,633	16,565	19,497	22,429	25,361	28,293	31,611	34,992	38,373	45,136	51,898	58,660	65,422
A343	2,684	6,486	10,289	14,091	17,894	21,696	25,499	29,301	33,104	36,906	40,709	44,511	48,314	56,171	65,581	74,991	82,034
A346	3,558	8,242	12,927	17,611	22,295	26,980	31,664	36,348	41,033	45,717	50,402	55,086	59,770	70,340	81,207	92,073	102,939
A359	3,922	6,846	9,769	12,693	15,616	19,027	22,597	26,167	29,737	33,307	36,877	40,447	44,017	51,157	58,288	65,425	72,562
A388	8,887	15,811	22,735	29,660	36,584	43,508	50,433	57,357	64,282	71,206	78,130	85,055	91,979	105,828	119,676	136,960	155,352
B744	5,174	10,951	16,728	22,505	28,282	34,059	39,836	45,613	51,390	57,167	62,944	68,721	74,498	86,052	99,107	113,116	127,125
B748	6,000	11,302	16,604	21,906	27,208	32,511	37,813	43,115	48,417	53,719	59,021	64,323	69,847	82,693	95,539	108,384	121,230
B762	1,279	4,146	7,012	9,878	12,744	15,610	18,476	21,342	24,209	27,075	29,941	32,807	35,673	41,406	47,138	52,870	58,602
B763	1,767	4,600	7,433	10,267	13,100	15,933	18,767	21,600	24,433	27,388	30,444	33,499	36,554	42,665	48,776	54,887	60,998
B764	1,764	4,816	7,869	10,921	13,974	17,026	20,079	23,131	26,184	29,236	32,288	35,341	38,393	44,498	50,603	56,708	62,813
B772	3,253	7,024	10,794	14,564	18,334	22,104	25,874	29,644	33,415	37,185	40,955	44,725	48,495	56,749	65,104	73,459	81,814
B773	3,766	8,065	12,363	16,662	20,960	25,259	29,844	34,464	39,084	43,704	48,324	52,944	57,564	66,804	76,044	85,284	94,524
B77L	3,245	7,155	11,065	14,975	18,885	22,795	26,705	30,615	35,333	40,474	45,615	50,756	55,897	66,180	76,462	86,455	94,533
B77W	4,028	8,237	12,446	16,656	20,865	25,075	29,284	33,899	38,761	43,623	48,485	53,347	58,209	67,933	77,657	87,381	97,105
B788	2,035	4,592	7,148	9,705	12,261	14,818	17,374	19,931	22,822	25,821	28,819	31,818	34,816	40,813	46,810	52,807	58,804
B789	2,529	5,284	8,038	10,793	13,547	16,302	19,056	21,811	24,565	27,484	30,819	34,154	37,489	44,159	50,829	57,499	64,169
B78X	1,785	4,853	7,921	10,990	14,058	17,126	20,194	23,265	26,510	29,755	33,000	36,245	39,491	45,981	52,471	58,961	65,452
MD11	2,080	6,767	11,454	16,141	20,828	25,515	30,202	34,889	39,576	44,264	48,951	53,638	58,325	67,699	77,073	86,448	95,822
A20N	839	2,208	3,471	4,725	6,038	7,400	8,761	10,123	11,485	12,847	14,208	15,570	16,932	19,655	22,379	25,102	27,826
A21N	1,105	2,507	3,909	5,310	6,855	8,441	10,027	11,613	13,199	14,785	16,370	17,956	19,542	22,714	25,886	29,058	32,229
A318	1,244	2,460	3,859	5,258	6,657	8,057	9,456	10,855	12,254	13,654	15,053	16,452	17,851	20,650	23,448	26,247	29,045
A319	849	2,526	3,915	5,304	6,889	8,478	10,067	11,657	13,246	14,835	16,424	18,013	19,602	22,780	25,959	29,137	32,315
A320	1,095	2,640	4,185	5,729	7,294	8,967	10,639	12,311	13,983	15,655	17,327	18,999	20,671	24,015	27,360	30,704	34,048
A321	843	3,036	4,865	6,695	8,524	10,353	12,182	14,011	15,840	17,669	19,498	21,327	23,156	26,815	30,473	34,131	37,789
B38M	685	2,018	3,351	4,692	6,082	7,472	8,862	10,252	11,642	13,032	14,422	15,812	17,202	19,982	22,762	25,542	28,322
B722	1,227	4,495	7,086	9,514	11,943	14,371	16,800	19,228	21,657	24,085	26,514	28,942	31,371	36,227	41,084	45,941	50,798
B733	819	2,500	4,020	5,536	7,053	8,569	10,085	11,602	13,118	14,634	16,150	17,667	19,183	22,216	25,248	28,281	31,313
B734	1,114	2,627	4,140	5,716	7,342	8,968	10,594	12,220	13,846	15,472	17,098	18,724	20,350	23,602	26,854	30,106	33,358
B735	785	2,518	4,055	5,592	7,129	8,665	10,202	11,739	13,276	14,813	16,350	17,887	19,424	22,498	25,571	28,645	31,719
B736	1,029	2,276	3,522	4,789	6,138	7,488	8,837	10,187	11,536	12,886	14,235	15,585	16,934	19,633	22,332	25,031	27,730
B737	606	2,170	3,557	4,952	6,399	7,847	9,295	10,743	12,190	13,638	15,086	16,534	17,981	20,877	23,772	26,668	29,563
B738	587	2,354	3,928	5,502	7,075	8,649	10,169	11,667	13,165	14,663	16,160	17,658	19,156	22,151	25,147	28,142	31,138
B739	1,052	2,705	4,358	6,010	7,663	9,316	10,969	12,622	14,275	15,928	17,581	19,233	20,886	24,192	27,498	30,803	34,109
B752	1,593	3,670	5,747	7,824	9,833	11,773	13,713	15,654	17,594	19,534	21,474	23,415	25,355	29,236	33,116	36,997	40,877
B753	1,379	3,823	6,268	8,712	11,157	13,601	16,046	18,490	20,935	23,379	25,824	28,268	30,713	35,602	40,491	45,380	50,269
BCS1	498	2,017	3,127	4,238	5,348	6,459	7,569	8,680	9,790	10,901	12,011	13,122	14,232	16,453	18,674	20,895	23,116
BCS3	576	2,093	3,296	4,499	5,702	6,906	8,109	9,312	10,515	11,718	12,921	14,125	15,328	17,734	20,140	22,547	24,953
E295	544	1,828	2,833	3,838	4,843	5,848	6,853	7,858	8,863	9,868	10,873	11,878	12,883	14,893	16,903	18,913	20,923
MD82	820	2,867	4,915	6,962	9,010	11,057	13,105	15,152	17,200	19,247	21,295	23,342	25,390	29,485	33,580	37,675	41,770
MD88	1,739	3,680	5,622	7,563	9,807	12,200	14,594	16,987	19,381	21,774	24,168	26,561	28,955	33,742	38,529	43,316	48,103
MD90	703	3,105	5,099	6,858	8,616	10,375	12,134	13,892	15,651	17,410	19,168	20,927	22,686	26,203	29,720	33,238	36,755
B462	750	2,396	4,043	5,690	7,336	8,983	10,630	12,277	13,923	15,570	17,217	18,863	20,510	23,804	27,097	30,390	33,684
B463	667	2,543	4,420	6,296	8,172	10,048	11,925	13,801	15,677	17,553	19,430	21,306	23,182	26,935	30,687	34,440	38,192
B712	705	2,368	4,030	5,693	7,356	9,018	10,681	12,344	14,006	15,669	17,332	18,994	20,657	23,982	27,307	30,633	33,958
C25B	121	555	800	1,046	1,291	1,537	1,782	2,028	2,273	2,519	2,764	3,010	3,255	3,746	4,237	4,728	5,219
C25C	171	627	936	1,245	1,554	1,863	2,172	2,481	2,790	3,099	3,408	3,717	4,026	4,644	5,262	5,880	6,498
C550	199	702	1,039	1,376	1,713	2,050	2,386	2,723	3,060	3,397	3,734	4,071	4,408	5,081	5,755	6,429	7,102
C56X	217	765	1,106	1,448	1,790	2,132	2,474	2,816	3,158	3,500	3,841	4,183	4,525	5,209	5,893	6,576	7,260
C68A	282	989	1,430	1,872	2,313	2,755	3,196	3,638	4,079	4,521	4,962	5,404	5,845	6,728	7,611	8,494	9,377
C750	221	1,059	1,530	2,001	2,472	2,943	3,414	3,885	4,356	4,827	5,298	5,769	6,240	7,182	8,124	9,066	10,008
CL30	256	1,010	1,519	2,027	2,536	3,044	3,552	4,061	4,569	5,077	5,586	6,094	6,602	7,619	8,636	9,652	10,669
CL35	308	1,008	1,476	1,927	2,418	2,912	3,405	3,898	4,391	4,884	5,378	5,871	6,364	7,350	8,337	9,323	10,310
CL60	320	1,060	1,650	2,240	2,853	3,508	4,164	4,819	5,475	6,131	6,786	7,442	8,097	9,408	10,719	12,031	13,342
CRJ1	454	1,223	1,981	2,653	3,325	3,997	4,669	5,341	6,013	6,685	7,357	8,029	8,701	10,045	11,389	12,733	14,077
CRJ2	387	1,228	2,020	2,732	3,443	4,155	4,867	5,578	6,290	7,002	7,714	8,425	9,137	10,560	11,984	13,407	14,831

Table A-1.2.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operators data from the COFdb

	Fuel (in kg) for given Great Circle Distance (in km)																
Type Designator	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000	10000
CRJ7	501	1,665	2,655	3,646	4,636	5,627	6,617	7,608	8,598	9,589	10,579	11,570	12,560	14,541	16,522	18,503	20,484
CRJ9	579	1,773	2,778	3,759	4,740	5,720	6,701	7,682	8,662	9,643	10,624	11,604	12,585	14,546	16,507	18,469	20,430
CRJX	566	1,847	2,926	4,004	5,082	6,160	7,238	8,316	9,394	10,472	11,550	12,629	13,707	15,863	18,019	20,175	22,332
DC95	1,684	3,675	5,666	7,657	9,648	11,638	13,629	15,620	17,611	19,602	21,593	23,584	25,574	29,556	33,538	37,519	41,501
E135	262	1,291	1,984	2,657	3,250	3,843	4,436	5,029	5,622	6,216	6,809	7,402	7,995	9,181	10,367	11,553	12,739
E145	328	1,275	1,951	2,627	3,303	3,979	4,655	5,331	6,007	6,683	7,359	8,035	8,711	10,062	11,414	12,766	14,118
E170	495	1,773	2,734	3,939	5,145	6,350	7,556	8,762	9,967	11,173	12,379	13,584	14,790	17,201	19,612	22,024	24,435
E190	706	2,099	3,285	4,497	5,793	7,088	8,383	9,678	10,974	12,269	13,564	14,859	16,155	18,745	21,336	23,926	26,517
E195	537	2,157	3,458	4,759	6,060	7,361	8,662	9,963	11,264	12,565	13,866	15,167	16,468	19,070	21,672	24,274	26,876
E290	560	1,797	2,719	3,640	4,562	5,484	6,406	7,327	8,249	9,171	10,093	11,014	11,936	13,780	15,623	17,466	19,310
E35L	321	1,235	1,899	2,562	3,225	3,889	4,552	5,216	5,879	6,543	7,206	7,869	8,533	9,860	11,187	12,513	13,840
E45X	327	1,392	2,196	2,999	3,752	4,463	5,175	5,886	6,597	7,308	8,020	8,731	9,442	10,865	12,287	13,709	15,132
E55P	211	667	944	1,209	1,474	1,739	2,004	2,269	2,534	2,800	3,065	3,330	3,595	4,125	4,655	5,186	5,716
E75L	572	1,649	2,678	3,628	4,578	5,528	6,478	7,428	8,378	9,328	10,278	11,228	12,178	14,078	15,978	17,878	19,778
F100	713	2,268	3,571	4,868	6,165	7,462	8,759	10,056	11,353	12,650	13,947	15,244	16,541	19,135	21,729	24,323	26,917
F2TH	314	1,037	1,548	2,059	2,569	3,080	3,591	4,102	4,613	5,124	5,634	6,145	6,656	7,678	8,699	9,721	10,743
F70	640	1,957	3,126	4,296	5,466	6,635	7,805	8,975	10,145	11,314	12,484	13,654	14,824	17,163	19,502	21,842	24,181
F900	351	1,114	1,724	2,333	2,943	3,552	4,162	4,772	5,381	5,991	6,600	7,210	7,819	9,039	10,258	11,477	12,696
FA50	266	1,109	1,684	2,224	2,764	3,304	3,844	4,384	4,924	5,464	6,004	6,544	7,084	8,164	9,244	10,324	11,404
FA7X	340	1,344	2,016	2,687	3,359	4,030	4,702	5,373	6,045	6,716	7,388	8,059	8,731	10,074	11,417	12,760	14,103
FA8X	560	1,279	1,997	2,716	3,434	4,153	4,871	5,590	6,308	7,027	7,745	8,463	9,182	10,619	12,056	13,493	14,930
G280	272	888	1,365	1,841	2,318	2,794	3,271	3,747	4,224	4,700	5,177	5,653	6,130	7,083	8,036	8,989	9,942
GL5T	714	1,773	2,718	3,572	4,427	5,281	6,136	6,990	7,845	8,699	9,554	10,408	11,263	12,972	14,681	16,390	18,099
GLEX	612	1,734	2,611	3,489	4,367	5,244	6,122	6,999	7,877	8,755	9,632	10,510	11,387	13,143	14,898	16,653	18,408
GLF4	544	1,712	2,540	3,367	4,194	5,021	5,848	6,675	7,503	8,330	9,157	9,984	10,811	12,466	14,120	15,774	17,429
GLF5	676	1,677	2,478	3,278	4,079	4,880	5,681	6,481	7,282	8,083	8,884	9,685	10,460	11,986	13,512	15,038	16,564
GLF6	391	1,610	2,432	3,255	4,077	4,899	5,721	6,543	7,366	8,188	9,010	9,832	10,654	12,299	13,943	15,587	17,232
H25B	236	802	1,234	1,665	2,097	2,528	2,960	3,391	3,823	4,254	4,686	5,117	5,549	6,412	7,275	8,138	9,001
LJ31	132	554	895	1,209	1,415	1,621	1,827	2,033	2,239	2,445	2,651	2,857	3,063	3,475	3,887	4,299	4,711
LJ40	132	659	991	1,322	1,654	1,985	2,317	2,648	2,980	3,311	3,643	3,975	4,306	4,969	5,632	6,295	6,959
LJ45	174	700	1,045	1,372	1,698	2,025	2,351	2,678	3,004	3,331	3,657	3,984	4,310	4,963	5,616	6,269	6,922
LJ60	206	653	1,028	1,403	1,778	2,153	2,528	2,903	3,278	3,652	4,027	4,402	4,777	5,527	6,277	7,026	7,776
LJ75	123	588	909	1,230	1,551	1,872	2,193	2,514	2,835	3,156	3,477	3,798	4,119	4,761	5,403	6,045	6,687
RJ85	911	2,487	4,063	5,639	7,215	8,791	10,367	11,943	13,519	15,095	16,671	18,247	19,823	22,975	26,127	29,279	32,431
AN26	261	1,656	3,022	3,714	4,406	5,098	5,790	6,482	7,174	7,866	8,558	9,250	9,942	11,326	12,710	14,094	15,478
AT43	118	719	1,274	1,829	2,383	2,938	3,493	4,047	4,602	5,157	5,711	6,266	6,821	7,930	9,039	10,149	11,258
AT45	135	835	1,417	1,992	2,567	3,143	3,718	4,294	4,869	5,444	6,020	6,595	7,170	8,321	9,472	10,623	11,773
AT46	138	865	1,510	2,155	2,800	3,445	4,090	4,735	5,380	6,025	6,670	7,315	7,960	9,250	10,540	11,830	13,120
AT72	54	866	1,489	2,112	2,735	3,358	3,981	4,604	5,227	5,850	6,473	7,096	7,719	8,965	10,211	11,457	12,703
AT75	147	909	1,583	2,258	2,932	3,607	4,281	4,956	5,630	6,305	6,979	7,654	8,328	9,677	11,026	12,375	13,724

Table A-1.2.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operators data from the COFdb

	Fuel (in kg) for given Great Circle Distance (in km)																
Type Designator	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000	10000
AT76	186	921	1,608	2,296	2,983	3,670	4,358	5,045	5,733	6,420	7,107	7,795	8,482	9,857	11,232	12,607	13,981
B190	96	446	796	1,146	1,496	1,845	2,195	2,545	2,895	3,245	3,595	3,944	4,294	4,994	5,694	6,393	7,093
BE30	78	407	736	1,056	1,226	1,396	1,566	1,736	1,906	2,076	2,246	2,416	2,586	2,926	3,265	3,605	3,945
D328	141	674	1,208	1,741	2,274	2,808	3,341	3,874	4,408	4,941	5,474	6,008	6,541	7,608	8,674	9,741	10,808
DH8A	96	841	1,586	2,332	3,077	3,822	4,567	5,313	6,058	6,803	7,548	8,294	9,039	10,529	12,020	13,510	15,001
DH8D	273	1,174	2,009	2,844	3,678	4,513	5,348	6,183	7,018	7,852	8,687	9,522	10,357	12,026	13,696	15,366	17,035
F50	108	865	1,486	2,107	2,727	3,348	3,969	4,590	5,211	5,832	6,453	7,074	7,695	8,937	10,179	11,421	12,663
SB20	387	1,005	1,623	2,241	2,859	3,477	4,095	4,713	5,331	5,949	6,567	7,185	7,803	9,039	10,275	11,511	12,747
SF34	149	617	1,085	1,553	2,021	2,489	2,957	3,425	3,893	4,361	4,829	5,297	5,765	6,701	7,637	8,573	9,509
MD87	1,691	3,154	4,616	6,079	7,720	9,517	11,315	13,112	14,910	16,707	18,505	20,302	22,100	25,695	29,290	32,885	36,480
C525	103	463	694	924	1,155	1,385	1,616	1,846	2,077	2,307	2,538	2,768	2,999	3,460	3,921	4,382	4,843
C55B	207	616	1,025	1,434	1,843	2,252	2,661	3,070	3,479	3,888	4,297	4,706	5,115	5,933	6,751	7,569	8,387
E75S	671	1,951	3,072	4,165	5,258	6,351	7,444	8,537	9,630	10,723	11,816	12,909	14,002	16,188	18,374	20,560	22,746
GA5C	524	1,480	2,253	2,958	3,664	4,370	5,076	5,782	6,488	7,193	7,899	8,605	9,311	10,723	12,134	13,546	14,958
GA6C	476	1,616	2,430	3,243	4,057	4,871	5,684	6,498	7,312	8,125	8,939	9,753	10,566	12,194	13,821	15,448	17,076
BE4W	159	512	780	1,047	1,315	1,582	1,850	2,118	2,385	2,653	2,921	3,188	3,456	3,991	4,526	5,061	5,597
GL7T	792	1,610	2,428	3,246	4,064	4,882	5,700	6,518	7,336	8,154	8,972	9,790	10,608	12,244	13,880	15,516	17,152
AN72	1,122	2,635	4,148	5,662	7,175	8,688	10,202	11,715	13,228	14,741	16,255	17,768	19,281	22,308	25,335	28,361	31,388
BE20	164	399	634	869	1,104	1,339	1,574	1,809	2,044	2,279	2,514	2,749	2,984	3,454	3,924	4,394	4,864
A225	1,381	15,731	30,081	44,431	58,781	73,131	87,481	101,831	116,181	129,335	137,665	145,995	154,325	170,985	187,645	204,305	220,965
AN22	4,238	10,352	16,466	22,580	28,694	34,808	40,922	47,036	53,150	59,264	65,378	71,492	77,606	89,834	102,062	114,290	126,518
B350	161	431	701	971	1,241	1,511	1,781	2,051	2,321	2,591	2,861	3,131	3,401	3,941	4,481	5,021	5,561
C25A	97	531	769	1,008	1,247	1,486	1,724	1,963	2,202	2,441	2,679	2,918	3,157	3,634	4,112	4,589	5,067
C510	87	410	618	768	919	1,069	1,220	1,370	1,521	1,671	1,822	1,972	2,123	2,424	2,725	3,026	3,327
C650	215	883	1,323	1,763	2,202	2,642	3,082	3,521	3,961	4,401	4,840	5,280	5,720	6,599	7,478	8,358	9,237
C680	204	952	1,398	1,844	2,290	2,735	3,181	3,627	4,073	4,519	4,964	5,410	5,856	6,748	7,639	8,531	9,423
E50P	125	422	636	819	1,003	1,187	1,370	1,554	1,738	1,921	2,105	2,288	2,472	2,839	3,207	3,574	3,941
E545	237	981	1,440	1,866	2,291	2,716	3,141	3,566	3,992	4,417	4,842	5,267	5,692	6,543	7,393	8,244	9,094
E550	231	1,002	1,484	1,967	2,449	2,932	3,414	3,897	4,379	4,862	5,344	5,827	6,309	7,274	8,239	9,204	10,169
HDJT	123	428	654	825	996	1,167	1,338	1,509	1,680	1,851	2,022	2,193	2,364	2,706	3,048	3,390	3,732
PC24	165	712	1,043	1,375	1,706	2,038	2,370	2,701	3,033	3,364	3,696	4,027	4,359	5,022	5,685	6,348	7,012

Table A-1.2.b. Aircraft types (by ICAO type designator) modelled with equivalent aircraft types

	Fuel (in kg) for given Great Circle Distance (in km)																
Type Designator	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000	10000
A30B	2,634	5,414	8,193	10,972	13,751	16,530	19,309	22,088	24,867	27,647	30,426	33,205	35,984	41,542	47,100	52,659	58,217
A338	1,886	4,789	7,692	10,595	13,498	16,401	19,303	22,206	25,109	28,012	31,298	34,645	37,993	44,688	51,383	58,079	64,774
A342	2,544	6,149	9,753	13,358	16,962	20,567	24,171	27,776	31,380	34,985	38,589	42,194	45,798	53,246	62,166	71,087	77,762
A345	3,580	8,293	13,007	17,720	22,434	27,148	31,861	36,575	41,288	46,002	50,715	55,429	60,142	70,778	81,712	92,646	103,580
A35K	4,525	7,898	11,272	14,645	18,018	21,952	26,071	30,190	34,309	38,428	42,547	46,666	50,785	59,023	67,251	75,485	83,720
B741	4,426	9,368	14,309	19,251	24,193	29,135	34,077	39,019	43,960	48,902	53,844	58,786	63,728	73,611	84,779	96,763	108,747
B742	4,894	10,358	15,823	21,288	26,752	32,217	37,681	43,146	48,610	54,075	59,540	65,004	70,469	81,398	93,747	106,998	120,250
B743	4,916	10,404	15,893	21,382	26,870	32,359	37,848	43,337	48,825	54,314	59,803	65,291	70,780	81,758	94,161	107,471	120,781
B74R	4,235	8,965	13,694	18,423	23,153	27,882	32,611	37,341	42,070	46,799	51,529	56,258	60,987	70,446	81,133	92,602	104,070
B74S	4,108	8,696	13,283	17,871	22,458	27,046	31,633	36,221	40,808	45,396	49,983	54,571	59,158	68,333	78,700	89,824	100,949
A19N	836	2,201	3,459	4,709	6,017	7,374	8,731	10,088	11,445	12,802	14,159	15,516	16,873	19,587	22,301	25,015	27,729
B37M	648	1,909	3,170	4,439	5,754	7,069	8,384	9,699	11,015	12,330	13,645	14,960	16,275	18,905	21,535	24,165	26,795
B39M	742	2,188	3,633	5,088	6,595	8,102	9,609	11,116	12,623	14,130	15,637	17,144	18,651	21,666	24,680	27,694	30,708
B3XM	724	2,134	3,544	4,963	6,434	7,904	9,374	10,845	12,315	13,785	15,256	16,726	18,196	21,137	24,077	27,018	29,959
MD81	792	2,771	4,749	6,728	8,706	10,685	12,664	14,642	16,621	18,599	20,578	22,556	24,535	28,492	32,449	36,406	40,363
MD83	902	3,155	5,409	7,662	9,915	12,168	14,421	16,674	18,927	21,181	23,434	25,687	27,940	32,446	36,952	41,459	45,965
B461	676	2,160	3,645	5,129	6,614	8,098	9,582	11,067	12,551	14,036	15,520	17,005	18,489	21,458	24,427	27,396	30,365
B732	725	2,213	3,558	4,899	6,241	7,583	8,925	10,267	11,608	12,950	14,292	15,634	16,976	19,659	22,343	25,026	27,710
C560	235	828	1,225	1,623	2,020	2,417	2,815	3,212	3,609	4,007	4,404	4,801	5,199	5,993	6,788	7,582	8,377
FA6X	360	1,423	2,134	2,846	3,557	4,268	4,979	5,690	6,401	7,112	7,823	8,534	9,246	10,668	12,090	13,512	14,934
GA7C	439	1,809	2,732	3,655	4,579	5,502	6,426	7,349	8,273	9,196	10,119	11,043	11,966	13,813	15,660	17,507	19,354
H25A	219	744	1,144	1,544	1,944	2,344	2,744	3,145	3,545	3,945	4,345	4,745	5,145	5,945	6,745	7,546	8,346
H25C	263	894	1,374	1,855	2,335	2,816	3,297	3,777	4,258	4,738	5,219	5,700	6,180	7,141	8,103	9,064	10,025
LJ25	94	471	709	946	1,183	1,420	1,657	1,895	2,132	2,369	2,606	2,843	3,081	3,555	4,029	4,504	4,978
LJ35	115	575	865	1,154	1,443	1,733	2,022	2,311	2,601	2,890	3,180	3,469	3,758	4,337	4,916	5,494	6,073
LJ55	170	683	1,020	1,339	1,657	1,976	2,294	2,613	2,932	3,250	3,569	3,888	4,206	4,843	5,481	6,118	6,755
LJ70	174	702	1,048	1,375	1,702	2,029	2,356	2,684	3,011	3,338	3,665	3,993	4,320	4,974	5,629	6,283	6,938
RJ1H	690	2,631	4,571	6,512	8,453	10,393	12,334	14,274	16,215	18,156	20,096	22,037	23,978	27,859	31,740	35,622	39,503
RJ70	899	2,455	4,011	5,566	7,122	8,678	10,234	11,789	13,345	14,901	16,456	18,012	19,568	22,679	25,791	28,902	32,014
AN30	250	1,587	2,896	3,559	4,223	4,886	5,549	6,212	6,875	7,538	8,202	8,865	9,528	10,854	12,181	13,507	14,833
AN32	293	1,863	3,400	4,178	4,957	5,735	6,514	7,292	8,071	8,849	9,628	10,406	11,185	12,742	14,299	15,856	17,413
AT73	54	867	1,491	2,115	2,739	3,363	3,987	4,611	5,235	5,859	6,483	7,107	7,731	8,979	10,227	11,476	12,724
DH8B	154	664	1,135	1,607	2,079	2,551	3,023	3,495	3,967	4,439	4,911	5,382	5,854	6,798	7,742	8,686	9,629
DH8C	182	783	1,339	1,896	2,453	3,009	3,566	4,123	4,679	5,236	5,793	6,349	6,906	8,019	9,133	10,246	11,359
DHC7	190	814	1,393	1,972	2,551	3,130	3,709	4,288	4,867	5,446	6,025	6,604	7,183	8,341	9,499	10,657	11,815

Table A-1.2.c. Aircraft types (by ICAO type designator) modelled with an ICAO Fuel Formula

	Fuel (in kg) for given Great Circle Distance (in km)																
Type Designator	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000	10000
DC10	3,297	7,887	12,476	17,066	21,655	26,245	31,309	36,660	42,010	47,361	52,711	58,062	63,412	74,113	85,021	96,583	108,145
DC85	3,118	6,126	9,135	12,143	15,152	18,160	21,169	24,177	27,186	30,194	33,203	36,211	39,220	45,237	51,254	57,271	63,288
DC86	3,118	6,126	9,135	12,143	15,152	18,160	21,169	24,177	27,186	30,194	33,203	36,211	39,220	45,237	51,254	57,271	63,288
DC87	3,118	6,126	9,135	12,143	15,152	18,160	21,169	24,177	27,186	30,194	33,203	36,211	39,220	45,237	51,254	57,271	63,288
IL62	2,656	6,827	10,997	15,168	19,338	23,509	27,679	31,850	36,020	40,191	44,361	48,532	52,702	61,043	69,384	77,725	86,066
IL76	7,415	11,716	16,018	20,749	25,845	30,941	36,037	41,133	46,229	51,325	56,421	61,517	66,613	76,805	86,997	97,189	107,381
IL86	7,365	12,963	18,561	24,159	29,757	35,427	41,154	46,882	52,609	58,337	64,064	69,792	75,519	86,974	98,429	109,884	121,339
IL96	2,477	7,237	11,998	16,758	21,519	26,279	31,040	35,800	40,561	45,321	50,082	54,842	59,603	69,124	78,645	88,166	97,492
L101	2,733	7,649	12,566	17,482	22,399	27,315	32,232	37,148	42,065	46,981	51,898	57,340	63,066	74,518	85,970	97,422	108,874
B701	2,632	6,027	9,421	12,816	16,210	19,605	22,999	26,394	29,594	32,680	35,766	38,852	41,938	48,110	54,282	60,454	66,626
B721	1,520	3,586	5,651	7,717	9,782	11,848	13,788	15,716	17,644	19,572	21,500	23,428	25,356	29,212	33,068	36,924	40,780
T134	2,065	3,584	5,104	6,623	8,142	9,662	11,181	12,701	14,220	15,740	17,259	18,779	20,298	23,337	26,376	29,415	32,454
T154	2,805	5,809	8,813	11,817	14,821	17,825	20,734	23,594	26,453	29,313	32,172	35,032	37,891	43,610	49,329	55,048	60,767
T204	2,801	5,806	8,812	11,817	14,823	17,828	20,734	23,594	26,453	29,313	32,172	35,032	37,891	43,610	49,329	55,048	60,767
A148	783	1,732	2,681	3,630	4,579	5,528	6,477	7,427	8,376	9,325	10,274	11,223	12,172	14,071	15,969	17,867	19,766
BA11	558	2,209	3,861	5,512	7,164	8,815	10,467	12,118	13,770	15,421	17,073	18,724	20,376	23,679	27,865	32,265	36,665
DC91	685	2,234	3,784	5,333	6,883	8,432	9,982	11,531	13,081	14,630	16,180	17,729	19,279	22,526	25,823	29,120	32,417
DC92	693	2,262	3,830	5,399	6,967	8,536	10,104	11,673	13,241	14,810	16,378	17,947	19,515	22,806	26,144	29,482	32,820
DC93	741	2,418	4,095	5,772	7,449	9,126	10,803	12,480	14,157	15,834	17,511	19,188	20,865	24,377	27,945	31,513	35,081
DC94	796	2,596	4,397	6,197	7,998	9,798	11,599	13,399	15,200	17,000	18,801	20,601	22,402	26,174	30,005	33,836	37,667
F28	419	2,221	3,404	4,588	5,771	6,955	8,138	9,322	10,505	11,689	12,872	14,056	15,239	17,606	19,973	22,340	24,707
FA10	159	844	1,293	1,743	2,192	2,642	3,091	3,541	3,990	4,440	4,889	5,339	5,788	6,687	7,586	8,485	9,384
J328	183	968	1,484	2,000	2,516	3,032	3,548	4,064	4,580	5,096	5,612	6,128	6,644	7,676	8,708	9,740	10,772
S601	184	407	630	853	1,076	1,299	1,522	1,745	1,968	2,191	2,414	2,637	2,860	3,307	3,753	4,199	4,645
WW24	122	646	990	1,334	1,678	2,022	2,366	2,710	3,054	3,398	3,742	4,086	4,430	5,118	5,806	6,494	7,182
YK40	171	906	1,389	1,872	2,355	2,838	3,321	3,804	4,287	4,770	5,253	5,736	6,219	7,185	8,151	9,117	10,083
YK42	703	3,514	5,076	6,638	8,200	9,762	11,324	12,886	14,448	16,010	17,572	19,134	20,696	23,820	26,944	30,068	33,192
A140	314	963	1,612	2,261	2,909	3,558	4,207	4,856	5,505	6,153	6,802	7,451	8,100	9,397	10,695	11,993	13,290
A748	321	982	1,644	2,306	2,968	3,629	4,291	4,953	5,615	6,276	6,938	7,600	8,262	9,585	10,909	12,232	13,556
AN12	1,262	3,335	5,408	7,482	9,555	11,629	13,702	15,776	17,849	19,923	21,996	24,069	26,143	30,290	34,437	38,584	42,731
AN24	433	1,135	1,837	2,539	3,241	3,943	4,645	5,347	6,049	6,751	7,452	8,154	8,856	10,260	11,664	13,068	14,471
AN28	157	482	806	1,130	1,455	1,779	2,104	2,428	2,752	3,077	3,401	3,726	4,050	4,699	5,348	5,996	6,645
ATP	282	865	1,447	2,029	2,612	3,194	3,777	4,359	4,942	5,524	6,107	6,689	7,272	8,436	9,601	10,766	11,931
BELF	397	3,910	6,502	9,094	11,686	14,278	16,870	19,462	22,054	24,646	27,238	29,830	32,422	37,606	42,790	47,974	53,158
C130	869	2,664	4,459	6,254	8,049	9,844	11,639	13,434	15,229	17,024	18,819	20,614	22,409	25,999	29,589	33,179	36,769
C212	138	423	707	992	1,277	1,562	1,846	2,131	2,416	2,701	2,985	3,270	3,555	4,124	4,694	5,263	5,833
CN35	210	642	1,075	1,507	1,940	2,372	2,805	3,237	3,670	4,102	4,535	4,968	5,400	6,265	7,130	7,995	8,861
CVLP	20	1,294	1,856	2,418	2,980	3,542	4,104	4,666	5,228	5,790	6,352	6,914	7,476	8,600	9,724	10,848	11,972
CVLT	20	1,294	1,856	2,418	2,980	3,542	4,104	4,666	5,228	5,790	6,352	6,914	7,476	8,600	9,724	10,848	11,972
D228	115	353	590	828	1,065	1,303	1,540	1,778	2,015	2,253	2,491	2,728	2,966	3,441	3,916	4,391	4,866
DC3	6	397	569	742	914	1,087	1,259	1,432	1,604	1,777	1,949	2,122	2,294	2,639	2,984	3,329	3,674
DC6	22	1,412	2,026	2,639	3,253	3,866	4,480	5,093	5,707	6,320	6,934	7,547	8,161	9,388	10,615	11,842	13,069
DHC6	26	366	608	851	1,093	1,336	1,578	1,821	2,063	2,306	2,548	2,791	3,033	3,518	4,003	4,488	4,973
E110	35	342	569	796	1,023	1,250	1,477	1,704	1,931	2,158	2,385	2,612	2,839	3,293	3,747	4,201	4,655
E120	169	539	909	1,279	1,649	2,019	2,389	2,759	3,129	3,499	3,869	4,239	4,609	5,349	6,089	6,829	7,569
F27	48	1,048	1,743	2,438	3,133	3,828	4,523	5,218	5,913	6,608	7,303	7,998	8,693	10,083	11,473	12,863	14,253
G159	90	977	1,625	2,273	2,921	3,569	4,217	4,865	5,513	6,161	6,809	7,457	8,105	9,401	10,697	11,993	13,289
I114	113	1,195	1,987	2,779	3,571	4,363	5,155	5,947	6,739	7,531	8,323	9,115	9,907	11,491	13,075	14,659	16,243
IL18	890	2,729	4,567	6,405	8,243	10,082	11,920	13,758	15,596	17,435	19,273	21,111	22,949	26,626	30,302	33,979	37,655
JS31	120	369	618	867	1,115	1,364	1,613	1,861	2,110	2,359	2,607	2,856	3,105	3,602	4,100	4,597	5,094
JS32	129	394	659	924	1,190	1,455	1,720	1,986	2,251	2,516	2,782	3,047	3,312	3,843	4,373	4,904	5,435
JS41	177	544	910	1,276	1,642	2,008	2,375	2,741	3,107	3,473	3,839	4,206	4,572	5,304	6,037	6,769	7,501
L188	287	3,149	5,236	7,324	9,411	11,499	13,586	15,674	17,761	19,849	21,936	24,024	26,111	30,286	34,461	38,636	42,811
L410	49	434	722	1,010	1,298	1,586	1,874	2,162	2,450	2,738	3,026	3,314	3,602	4,178	4,754	5,330	5,906
N262	132	404	677	949	1,222	1,494	1,767	2,039	2,312	2,584	2,857	3,129	3,402	3,947	4,492	5,037	5,582
SC7	87	267	448	628	808	988	1,168	1,349	1,529	1,709	1,889	2,069	2,250	2,610	2,970	3,331	3,691
SH33	166	508	850	1,193	1,535	1,877	2,219	2,562	2,904	3,246	3,588	3,931	4,273	4,957	5,642	6,326	7,011
SH36	177	544	910	1,276	1,642	2,008	2,375	2,741	3,107	3,473	3,839	4,206	4,572	5,304	6,037	6,769	7,501
SW2	124	380	636	892	1,148	1,403	1,659	1,915	2,171	2,427	2,683	2,939	3,195	3,707	4,218	4,730	5,242
YS11	87	958	1,593	2,228	2,863	3,498	4,133	4,768	5,403	6,038	6,673	7,308	7,943	9,213	10,483	11,753	13,023

APPENDIX A-2: ICAO CO_2 Estimation Model (CEM) based on Block Time (BT) Input in version 2025 of the ICAO CORSIA CERT

Table A-2.1.a. Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operator data from the COFdb

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
A124	An-124 Ruslan	Yes				
A306	A-300B4-600	Yes				
A310	A-310	Yes				
A332	A-330-200	Yes				
A333	A-330-300	Yes				
A339	A-330-900	Yes				
A343	A-340-300	Yes				
A346	A-340-600	Yes				
A359	A-350-900 XWB	Yes				
A388	A-380-800	Yes				
B744	747-400 (international, winglets)	Yes				
B748	747-8	Yes				
B762	767-200	Yes				
B763	767-300	Yes				
B764	767-400	Yes				
B772	777-200	Yes				
B773	777-300	Yes				
B77L	777-200LR	Yes				
B77W	777-300ER	Yes				
B788	787-8 Dreamliner	Yes				
B789	787-9 Dreamliner	Yes				
B78X	787-10 Dreamliner	Yes				
MD11	MD-11	Yes				
A20N	A-320neo	Yes				
A21N	A-321neo	Yes				
A318	A-318	Yes				
A319	A-319	Yes				
A320	A-320	Yes				
A321	A-321	Yes				
B38M	737 MAX 8	Yes				
B722	727-200	Yes				
B733	737-300	Yes				
B734	737-400	Yes				
B735	737-500	Yes				
B736	737-600	Yes				
B737	737-700	Yes				
B738	737-800	Yes				
B739	737-900	Yes				
B752	757-200	Yes				
B753	757-300	Yes				
BCS1	BD-500 CSeries CS100	Yes				
BCS3	BD-500 CSeries CS300	Yes				
E295	E195-E2	Yes				
MD82	MD-82	Yes				
MD88	MD-88	Yes				
MD90	MD-90	Yes				
B462	BAe-146-200	Yes				
B463	BAe-146-300	Yes				
B712	717-200	Yes				
C25B	525B Citation CJ3	Yes				
C25C	525C Citation CJ4	Yes				
C550	550 Citation 2	Yes				
C56X	560XL Citation Excel	Yes				
C68A	680A Citation Latitude	Yes				
C750	750 Citation 10	Yes				
CL30	BD-100 Challenger 300	Yes				
CL35	BD-100 Challenger 350	Yes				
CL60	CL-600 Challenger 650	Yes				
CRJ1	Regional Jet CRJ-100	Yes				
CRJ2	Challenger 800	Yes				

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-2.1.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operator data from the COFdb

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
CRJ7	Challenger 870	Yes				
CRJ9	Challenger 890	Yes				
CRJX	Regional Jet CRJ-1000	Yes				
DC95	DC-9-50	Yes				
E135	ERJ-135	Yes				
E145	ERJ-145EP	Yes				
E170	ERJ-170-100	Yes				
E190	ERJ-190 Lineage 1000	Yes				
E195	ERJ-190-200	Yes				
E290	E190-E2	Yes				
E35L	EMB-135BJ Legacy	Yes				
E45X	EMB-145XR	Yes				
E55P	EMB-505 Phenom 300	Yes				
E75L	ERJ-170-200 (long wing)	Yes				
F100	100	Yes				
F2TH	Falcon 2000	Yes				
F70	70	Yes				
F900	Falcon 900	Yes				
FA50	Falcon 50	Yes				
FA7X	Falcon 7X	Yes				
FA8X	Falcon 8X	Yes				
G280	Gulfstream G280	Yes				
GL5T	Global 5000	Yes				
GLEX	Global Express	Yes				
GLF4	Gulfstream 4	Yes				
GLF5	Gulfstream 5	Yes				
GLF6	Gulfstream G650	Yes				
H25B	Hawker 800	Yes				
LJ31	31	Yes				
LJ40	40	Yes				
LJ45	45	Yes				
LJ60	60	Yes				
LJ75	75	Yes				
RJ85	RJ-85 Avroliner	Yes				
AN26	An-26	Yes				
AT43	ATR-42-300	Yes				
AT45	ATR-42-500	Yes				
AT46	ATR-42-600	Yes				
AT72	ATR-72-201	Yes				
AT75	ATR-72-500	Yes				

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-2.1.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operator data from the COFdb

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
AT76	ATR-72-600	Yes				
B190	1900	Yes				
BE30	300 Super King Air	Yes				
D328	328	Yes				
DH8A	Dash 8 (100)	Yes				
DH8D	Dash 8 (400)	Yes				
F50	50 Maritime Enforcer	Yes				
SB20	2000	Yes				
SF34	SF-340	Yes				
MD87	MD-87	Yes				
C525	525 Citation CJ1	Yes				
C55B	550B Citation Bravo	Yes				
E75S	ERJ-170-200 (short wing)	Yes				
GA5C	Gulfstream G500 (G-7)	Yes				
GA6C	G-7 Gulfstream G600	Yes				
BE4W	Hawker 400XT	Yes				
GL7T	Global 7000	Yes				
AN72	An-72	Yes				
BE20	Super King Air (200)	Yes				
A225	An-225 Mriya	Yes				
AN22	An-22	Yes				
B350	King Air 350	Yes				
C25A	Citation Jet/M2	Yes				
C510	Citation Mustang	Yes				
C650	650 Citation 3	Yes				
C680	680 Citation Sovereign	Yes				
E50P	Phenom 100	Yes				
E545	EMB-545 Legacy 450	Yes				
E550	EMB-550 Legacy 500	Yes				
HDJT	HA-420	Yes				
PC24	PC-24	Yes				

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-2.1.b. Aircraft types (by ICAO type designator) modelled with equivalent aircraft types

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
A30B	A-300B2		Yes	A306		
A338	A-330-800		Yes	A339		
A342	A-340-200		Yes	A343		
A345	A-340-500		Yes	A346		
A35K	A-350-1000 XWB		Yes	A359		
B741	747-100		Yes	B744		
B742	747-200		Yes	B744		
B743	747-300		Yes	B744		
B74R	747SR		Yes	B744		
B74S	747SP		Yes	B744		
A19N	A-319neo		Yes	A20N		
B37M	737 MAX 7		Yes	B38M		
B39M	737 MAX 9		Yes	B38M		
B3XM	737 MAX 10		Yes	B38M		
MD81	MD-81		Yes	MD82		
MD83	MD-83		Yes	MD82		
B461	BAe-146-100		Yes	B462		
B732	737-200		Yes	B733		
C560	560 Citation 5		Yes	C550		
FA6X	Falcon 6X		Yes	FA7X		
GA7C	Gulfstream G700		Yes	GLF6		
H25A	HS-125-1		Yes	H25B		
H25C	Hawker 1000		Yes	H25B		
LJ25	25		Yes	LJ40		
LJ35	35		Yes	LJ40		
LJ55	55		Yes	LJ45		
LJ70	70		Yes	LJ45		
RJ1H	RJ-100 Avroliner		Yes	B463		
RJ70	RJ-70 Avroliner		Yes	RJ85		
AN30	An-30		Yes	AN26		
AN32	An-32		Yes	AN26		
AT73	ATR-72-211		Yes	AT72		
DH8B	Dash 8 (200)		Yes	DH8D		
DH8C	Dash 8 (300)		Yes	DH8D		
DHC7	DHC-7 Dash 7		Yes	DH8D		

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table A-2.1.c. Aircraft types (by ICAO type designator) modelled with ICAO Fuel Formula

Type Designator	Example of Model*	CEM based on AO data (from COFdb)	CEM based on Equivalent Aircraft Type		CEM based on ICAO Fuel Formula	
		Source of CEM	Source of CEM	Type Designator of Equivalent Aircraft	Source of CEM	ICAO Aircraft Code
DC10	DC-10					D10
DC85	DC-8-50					D8T
DC86	DC-8-60					D8L
DC87	DC-8-70					D8Q
IL62	Il-62					IL6
IL76	Il-76					IL7
IL86	Il-86					ILW
IL96	Il-96					IL9
L101	L-1011 TriStar					L10
B701	707-100					70M
B721	727-100					721
T134	Tu-134					TU3
T154	Tu-154					TU5
T204	Tu-204					T20
A148	An-148					A81
BA11	BAC-111 One-Eleven					B11
DC91	DC-9-10					D91
DC92	DC-9-20					D92
DC93	DC-9-30					D93
DC94	DC-9-40					D94
F28	F-28 Fellowship					F28
FA10	Falcon 10					DF2
J328	Dornier 328JET					FRJ
S601	SN-601 Corvette					NDC
WW24	1124 Westwind					WWP
YK40	Yak-40					YK4
YK42	Yak-42					YK2
A140	IRAN-140 Faraz					A40
A748	748					HS7
AN12	An-12					ANF
AN24	An-24					AN4
AN28	An-28					A28
ATP	ATP					ATP
BELF	SC-5 Belfast					SHB
C130	L-100 Hercules					LOH
C212	C-212 Aviocar					CS2
CN35	CN-235					CS5
CVLP	Convairliner					CVR
CVLT	Cosmopolitan					CV5
D228	Dornier 228					D28
DC3	DC-3					DC3
DC6	DC-6					DC6
DHC6	DHC-6 Twin Otter					DHT
E110	EMB-110 Bandeirante					EMB
E120	EMB-120 Brasilia					EM2
F27	F-27					F27
G159	G-159 Gulfstream 1					GRS
I114	Il-114					I14
IL18	Il-18					IL8
JS31	BAe-3100 Jetstream 31					J31
JS32	BAe-3200 Jetstream Super 31					J32
JS41	BAe-4100 Jetstream 41					J41
L188	Electra (L-188)					LOE
L410	L-410 Turbolet					L4T
N262	N-262 Frégate					ND2
SC7	SC-7 Skyliner					SHS
SH33	SD3-30					SH3
SH36	360					SH6
SW2	SA-26 Merlin 2					SWM
YS11	YS-11					YS1

** Example of model: Doc 8643 includes one or more model for a given type designator. Sample/example of model is provided in this table. For additional details of other applicable models for a given type designator see: https://www.icao.int/publications/DOC8643/Pages/Search.aspx*

Table format of ICAO CO_2 Estimation Models (CEMs) based on Block Time (BT) Input in version 2025 of the ICAO CORSIA CERT

*Note: Tables provide fuel in kg. CO_2 emissions can be calculated using CO_2 (in kg) = 3.16 * Fuel (in kg).*

Table A-2.2.a. Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operators data from the COFdb

	Fuel (in kg) for given Block Time (min)																
Type Designator	0	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960
A124	1,959	11,461	22,372	34,158	45,945	57,732	69,518	81,305	93,092	104,878	116,665	128,452	140,238	152,025	163,811	175,598	187,385
A306	603	4,836	9,070	13,303	17,536	21,769	26,002	30,235	34,469	38,702	42,935	47,168	51,401	55,635	59,868	64,101	68,334
A310	388	3,204	7,525	11,898	16,272	20,645	25,018	29,391	33,764	38,137	42,511	46,884	51,257	55,630	60,003	64,376	68,749
A332	218	4,612	9,007	14,227	19,540	25,168	30,966	36,764	42,562	48,360	54,157	59,955	65,753	71,551	77,349	83,147	88,945
A333	1,112	4,617	9,499	14,381	20,024	26,068	32,112	38,156	44,200	50,244	56,288	62,333	68,377	74,421	80,465	86,509	92,553
A339	180	3,687	8,555	13,423	18,290	23,158	28,026	33,953	39,916	45,878	51,840	57,802	63,764	69,726	75,688	81,650	87,612
A343	-	4,442	10,011	16,632	23,253	29,874	36,495	43,116	49,737	57,041	64,553	72,066	79,578	87,090	94,603	102,115	109,628
A346	-	6,354	14,001	21,648	29,295	36,943	44,590	52,237	61,324	70,794	80,264	89,735	99,205	108,675	118,145	127,615	137,085
A359	20	4,770	9,926	15,164	20,402	25,787	32,290	38,792	45,294	51,797	58,299	64,802	71,304	77,807	84,309	90,811	97,314
A388	550	8,807	19,788	31,994	44,201	56,408	68,615	80,822	93,071	107,754	122,437	137,120	151,803	166,486	181,169	195,852	210,535
B744	-	6,367	16,321	26,276	36,231	46,645	57,519	68,393	79,266	90,140	101,014	111,887	122,761	133,634	144,508	155,382	166,255
B748	-	7,525	16,789	26,053	35,317	44,581	53,845	63,109	74,892	86,805	98,718	110,631	122,544	134,457	146,370	158,283	170,196
B762	628	3,792	7,471	12,354	17,237	22,121	27,004	31,887	36,770	41,653	46,537	51,420	56,303	61,186	66,069	70,953	75,836
B763	23	3,268	7,987	12,707	17,427	22,147	26,914	31,890	36,867	41,844	46,821	51,797	56,774	61,751	66,728	71,704	76,681
B764	1,379	4,846	8,313	11,781	16,723	22,545	28,367	34,189	40,011	45,833	51,655	57,477	63,299	69,121	74,943	80,765	86,587
B772	253	5,066	10,233	16,493	22,753	29,079	36,566	44,052	51,539	59,026	66,512	73,999	81,486	88,972	96,459	103,946	111,432
B773	2,761	7,040	11,477	18,926	26,375	33,436	39,992	46,547	53,102	59,658	66,213	72,768	79,324	85,879	92,435	98,990	105,545
B77L	-	6,459	12,917	19,376	25,834	32,345	40,860	49,503	58,146	66,789	75,431	84,074	92,717	101,360	110,003	118,645	127,288
B77W	751	6,427	12,103	17,778	26,224	35,094	43,964	52,834	61,704	70,574	79,444	88,314	97,077	104,074	111,071	118,069	125,066
B788	-	3,729	7,825	12,104	16,383	20,661	25,980	31,435	36,890	42,346	47,801	53,256	58,711	64,167	69,622	75,077	80,533
B789	20	4,194	8,643	13,367	18,091	22,815	27,539	33,687	39,835	45,983	52,132	58,280	64,428	70,576	76,724	82,873	89,021
B78X	1,045	4,724	8,403	12,082	16,120	22,749	29,379	36,008	42,637	49,267	55,896	62,525	69,154	75,784	82,413	89,042	95,672
MD11	550	5,220	12,098	20,324	28,550	36,776	45,002	53,228	61,454	69,680	77,906	86,133	94,359	102,585	110,811	119,037	127,263
A20N	37	1,877	3,895	6,040	8,184	10,329	12,474	14,619	16,763	18,908	21,053	23,197	25,342	27,487	29,632	31,776	33,921
A21N	-	2,069	4,331	6,740	9,374	12,009	14,643	17,277	19,911	22,545	25,179	27,813	30,447	33,081	35,715	38,349	40,983
A318	62	2,080	4,125	6,705	9,285	11,864	14,444	17,023	19,603	22,183	24,762	27,342	29,921	32,501	35,081	37,660	40,240
A319	150	2,161	4,389	6,715	9,302	11,889	14,476	17,063	19,650	22,237	24,825	27,412	29,999	32,586	35,173	37,760	40,347
A320	-	2,261	4,622	7,234	9,845	12,456	15,068	17,679	20,290	22,901	25,513	28,124	30,735	33,347	35,958	38,569	41,181
A321	104	2,602	5,393	8,480	11,568	14,655	17,742	20,829	23,916	27,003	30,091	33,178	36,265	39,352	42,439	45,526	48,613
B38M	10	1,554	3,646	5,912	8,178	10,445	12,711	14,977	17,243	19,509	21,776	24,042	26,308	28,574	30,840	33,107	35,373
B722	640	3,723	7,788	11,853	15,919	19,984	24,049	28,115	32,180	36,245	40,311	44,376	48,441	52,507	56,572	60,637	64,703
B733	262	1,981	4,383	6,786	9,188	11,591	13,993	16,396	18,798	21,201	23,603	26,006	28,409	30,811	33,214	35,616	38,019
B734	365	2,183	4,573	7,108	9,642	12,177	14,712	17,246	19,781	22,315	24,850	27,385	29,919	32,454	34,989	37,523	40,058
B735	79	2,135	4,192	6,248	8,305	10,362	12,418	14,475	16,531	18,588	20,644	22,701	24,757	26,814	28,871	30,927	32,984
B736	24	1,894	3,813	5,733	7,652	9,571	11,491	13,410	15,329	17,249	19,168	21,087	23,007	24,926	26,845	28,765	30,684
B737	87	1,716	3,944	6,172	8,400	10,628	12,856	15,084	17,313	19,541	21,769	23,997	26,225	28,453	30,681	32,909	35,138
B738	279	1,980	4,400	6,950	9,478	11,840	14,202	16,564	18,926	21,288	23,650	26,012	28,374	30,736	33,098	35,460	37,822
B739	575	2,367	4,858	7,536	10,214	12,892	15,570	18,248	20,926	23,604	26,282	28,960	31,639	34,317	36,995	39,673	42,351
B752	661	3,071	5,924	9,138	12,352	15,566	18,780	21,994	25,209	28,423	31,637	34,851	38,065	41,279	44,493	47,708	50,922
B753	231	3,167	6,579	10,515	14,451	18,387	22,323	26,260	30,196	34,132	38,068	42,004	45,940	49,877	53,813	57,749	61,685
BCS1	-	1,654	3,379	5,100	6,821	8,541	10,262	11,983	13,704	15,424	17,145	18,866	20,587	22,307	24,028	25,749	27,469
BCS3	22	1,666	3,551	5,436	7,297	9,155	11,013	12,872	14,730	16,589	18,447	20,306	22,164	24,023	25,881	27,740	29,598
E295	7	1,549	3,144	4,814	6,484	8,153	9,823	11,492	13,162	14,832	16,501	18,171	19,841	21,510	23,180	24,849	26,519
MD82	173	2,805	5,615	8,602	11,590	14,577	17,564	20,552	23,539	26,526	29,514	32,501	35,488	38,476	41,463	44,450	47,438
MD88	168	2,969	5,770	8,453	9,837	11,222	12,607	13,992	15,377	16,762	18,147	19,531	20,916	22,301	23,686	25,071	26,456
MD90	27	2,499	5,084	7,717	10,350	12,983	15,616	18,248	20,881	23,514	26,147	28,780	31,413	34,046	36,678	39,311	41,944
B462	290	1,781	3,792	5,803	7,814	9,825	11,836	13,847	15,858	17,869	19,880	21,891	23,902	25,913	27,924	29,935	31,946
B463	163	1,923	3,682	5,442	7,202	8,961	10,721	12,481	14,240	16,000	17,760	19,519	21,279	23,039	24,798	26,558	28,318
B712	-	2,060	4,120	6,180	8,240	10,300	12,360	14,419	16,479	18,539	20,599	22,659	24,719	26,779	28,839	30,899	32,959
C25B	2	441	837	1,158	1,480	1,801	2,123	2,444	2,766	3,087	3,409	3,730	4,052	4,373	4,695	5,016	5,338
C25C	8	552	1,045	1,501	1,957	2,413	2,868	3,324	3,780	4,236	4,692	5,148	5,604	6,060	6,516	6,972	7,428
C550	10	525	956	1,345	1,735	2,124	2,513	2,902	3,291	3,681	4,070	4,459	4,848	5,237	5,627	6,016	6,405
C56X	0	631	1,177	1,682	2,187	2,693	3,198	3,704	4,209	4,714	5,220	5,725	6,231	6,736	7,241	7,747	8,252
C68A	15	817	1,560	2,201	2,843	3,484	4,125	4,766	5,407	6,048	6,689	7,330	7,971	8,612	9,253	9,894	10,535
C750	20	899	1,758	2,594	3,430	4,265	5,101	5,937	6,772	7,608	8,444	9,279	10,115	10,951	11,786	12,622	13,458
CL30	57	847	1,688	2,529	3,347	4,123	4,900	5,677	6,454	7,230	8,007	8,784	9,561	10,337	11,114	11,891	12,668
CL35	71	846	1,621	2,396	3,171	3,946	4,721	5,496	6,270	7,045	7,820	8,595	9,370	10,145	10,920	11,695	12,469
CL60	101	846	1,783	2,721	3,718	4,722	5,726	6,729	7,733	8,737	9,740	10,744	11,748	12,751	13,755	14,759	15,762
CRJ1	40	1,110	2,059	2,998	3,936	4,874	5,812	6,750	7,688	8,626	9,565	10,503	11,441	12,379	13,317	14,255	15,194
CRJ2	6	844	1,900	3,012	4,124	5,235	6,347	7,459	8,570	9,682	10,794	11,905	13,017	14,129	15,240	16,352	17,464

Table A-2.2.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operators data from the COFdb

	Fuel (in kg) for given Block Time (min)																
Type Designator	0	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960
CRJ7	26	1,367	2,901	4,223	5,544	6,865	8,187	9,508	10,829	12,151	13,472	14,793	16,115	17,436	18,757	20,079	21,400
CRJ9	94	1,539	2,984	4,428	5,873	7,317	8,762	10,207	11,651	13,096	14,540	15,985	17,430	18,874	20,319	21,763	23,208
CRJX	-	1,616	3,000	4,254	5,508	6,762	8,016	9,270	10,524	11,778	13,032	14,286	15,540	16,794	18,048	19,302	20,556
DC95	1,549	3,673	5,797	7,922	10,046	12,170	14,294	16,418	18,543	20,667	22,791	24,915	27,039	29,163	31,288	33,412	35,536
E135	28	1,077	2,127	3,177	4,226	5,276	6,326	7,375	8,425	9,475	10,524	11,574	12,624	13,673	14,723	15,773	16,822
E145	-	1,053	2,043	3,029	4,016	5,003	5,990	6,977	7,964	8,950	9,937	10,924	11,911	12,898	13,885	14,872	15,858
E170	130	1,455	3,020	4,585	6,151	7,716	9,281	10,847	12,412	13,977	15,543	17,108	18,673	20,239	21,804	23,369	24,935
E190	53	1,775	3,668	5,561	7,453	9,346	11,239	13,131	15,024	16,917	18,809	20,702	22,595	24,488	26,380	28,273	30,166
E195	83	1,795	3,906	6,018	8,129	10,240	12,351	14,463	16,574	18,685	20,797	22,908	25,019	27,130	29,242	31,353	33,464
E290	356	1,544	3,167	4,791	6,415	8,039	9,663	11,287	12,911	14,534	16,158	17,782	19,406	21,030	22,654	24,278	25,901
E35L	-	1,012	2,024	3,036	4,070	5,126	6,183	7,240	8,296	9,353	10,409	11,466	12,522	13,579	14,636	15,692	16,749
E45X	47	1,144	2,314	3,484	4,655	5,825	6,995	8,165	9,335	10,505	11,675	12,845	14,015	15,185	16,355	17,525	18,695
E55P	8	556	1,007	1,402	1,796	2,191	2,586	2,980	3,375	3,770	4,164	4,559	4,954	5,348	5,743	6,138	6,532
E75L	-	1,429	2,961	4,435	5,910	7,384	8,859	10,334	11,808	13,283	14,757	16,232	17,706	19,181	20,655	22,130	23,605
F100	-	1,855	3,833	5,573	7,277	8,981	10,685	12,389	14,093	15,797	17,501	19,205	20,909	22,613	24,317	26,021	27,725
F2TH	81	915	1,750	2,585	3,419	4,254	5,088	5,923	6,757	7,592	8,427	9,261	10,096	10,930	11,765	12,599	13,434
F70	137	1,641	3,340	5,039	6,738	8,437	10,136	11,835	13,534	15,233	16,932	18,631	20,330	22,029	23,728	25,427	27,126
F900	104	930	1,926	2,921	3,917	4,912	5,908	6,903	7,899	8,894	9,890	10,885	11,881	12,877	13,872	14,868	15,863
FA50	(0)	1,101	2,035	2,887	3,738	4,590	5,441	6,293	7,144	7,996	8,847	9,698	10,550	11,401	12,253	13,104	13,956
FA7X	49	1,192	2,334	3,477	4,619	5,762	6,904	8,046	9,189	10,331	11,474	12,616	13,759	14,901	16,044	17,186	18,329
FA8X	-	1,141	2,384	3,626	4,869	6,111	7,354	8,596	9,838	11,081	12,323	13,566	14,808	16,051	17,293	18,536	19,778
G280	10	783	1,602	2,394	3,148	3,902	4,657	5,411	6,165	6,919	7,674	8,428	9,182	9,936	10,691	11,445	12,199
GL5T	81	1,544	3,006	4,469	5,931	7,394	8,856	10,319	11,781	13,244	14,706	16,169	17,631	19,094	20,556	22,019	23,481
GLEX	103	1,505	2,906	4,308	5,709	7,226	8,785	10,344	11,904	13,463	15,023	16,582	18,141	19,701	21,260	22,820	24,379
GLF4	62	1,438	2,814	4,190	5,566	6,943	8,319	9,695	11,071	12,447	13,823	15,199	16,575	17,951	19,327	20,703	22,079
GLF5	380	1,672	2,963	4,255	5,627	7,017	8,407	9,797	11,187	12,577	13,968	15,358	16,748	18,138	19,528	20,918	22,308
GLF6	78	1,464	2,851	4,237	5,658	7,154	8,649	10,144	11,640	13,135	14,630	16,126	17,621	19,116	20,612	22,107	23,602
H25B	63	797	1,445	2,093	2,742	3,390	4,038	4,687	5,335	5,983	6,632	7,280	7,928	8,576	9,225	9,873	10,521
LJ31	88	487	950	1,414	1,878	2,342	2,806	3,270	3,734	4,197	4,661	5,125	5,589	6,053	6,517	6,981	7,445
LJ40	-	613	1,148	1,652	2,155	2,658	3,162	3,665	4,169	4,672	5,175	5,679	6,182	6,685	7,189	7,692	8,196
LJ45	45	612	1,179	1,746	2,313	2,881	3,448	4,015	4,582	5,150	5,717	6,284	6,851	7,419	7,986	8,553	9,120
LJ60	-	577	1,155	1,733	2,311	2,888	3,466	4,044	4,622	5,200	5,778	6,356	6,934	7,511	8,089	8,667	9,245
LJ75	-	523	1,045	1,568	2,091	2,614	3,136	3,659	4,182	4,704	5,227	5,750	6,273	6,795	7,318	7,841	8,364
RJ85	363	1,958	3,553	5,149	6,744	8,339	9,934	11,529	13,124	14,720	16,315	17,910	19,505	21,100	22,695	24,290	25,886
AN26	4	929	1,853	2,777	3,591	4,201	4,810	5,420	6,029	6,639	7,249	7,858	8,468	9,077	9,687	10,297	10,906
AT43	52	507	972	1,444	1,917	2,390	2,863	3,335	3,808	4,281	4,753	5,226	5,699	6,172	6,644	7,117	7,590
AT45	9	589	1,156	1,702	2,249	2,795	3,342	3,888	4,434	4,981	5,527	6,074	6,620	7,167	7,713	8,259	8,806
AT46	27	558	1,165	1,772	2,379	2,986	3,593	4,200	4,807	5,414	6,021	6,628	7,236	7,843	8,450	9,057	9,664
AT72	28	553	1,078	1,603	2,128	2,653	3,177	3,702	4,227	4,752	5,277	5,802	6,327	6,852	7,377	7,902	8,427
AT75	94	618	1,205	1,815	2,425	3,035	3,645	4,255	4,864	5,474	6,084	6,694	7,304	7,914	8,523	9,133	9,743

Table A-2.2.a (cont.). Aircraft types (by ICAO type designator) modelled with ICAO CEM based on aeroplane operators data from the COFdb

	Fuel (in kg) for given Block Time (min)																
Type Designator	0	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960
AT76	11	576	1,193	1,826	2,458	3,091	3,724	4,356	4,989	5,622	6,254	6,887	7,520	8,152	8,785	9,418	10,050
B190	-	298	600	902	1,204	1,507	1,809	2,111	2,413	2,715	3,017	3,319	3,622	3,924	4,226	4,528	4,830
BE30	110	343	577	810	1,044	1,277	1,510	1,744	1,977	2,211	2,444	2,677	2,911	3,144	3,378	3,611	3,845
D328	78	475	873	1,270	1,667	2,065	2,462	2,859	3,257	3,654	4,051	4,449	4,846	5,243	5,640	6,038	6,435
DH8A	3	491	979	1,467	1,955	2,443	2,932	3,420	3,908	4,396	4,884	5,372	5,860	6,348	6,836	7,325	7,813
DH8D	11	888	1,839	2,811	3,784	4,756	5,729	6,702	7,674	8,647	9,619	10,592	11,565	12,537	13,510	14,482	15,455
F50	96	541	1,085	1,628	2,171	2,715	3,258	3,801	4,345	4,888	5,432	5,975	6,518	7,062	7,605	8,149	8,692
SB20	-	849	1,698	2,548	3,397	4,246	5,095	5,944	6,793	7,643	8,492	9,341	10,190	11,039	11,889	12,738	13,587
SF34	108	373	638	902	1,167	1,432	1,697	1,961	2,226	2,491	2,756	3,021	3,285	3,550	3,815	4,080	4,344
MD87	82	2,621	5,161	7,720	10,528	13,337	16,145	18,954	21,762	24,571	27,379	30,188	32,997	35,805	38,614	41,422	44,231
C525	2	365	689	950	1,211	1,472	1,732	1,993	2,254	2,515	2,775	3,036	3,297	3,558	3,818	4,079	4,340
C55B	14	462	989	1,517	2,044	2,571	3,099	3,626	4,153	4,681	5,208	5,735	6,263	6,790	7,317	7,844	8,372
E75S	387	1,490	2,672	4,444	6,217	7,990	9,763	11,535	13,308	15,081	16,854	18,626	20,399	22,172	23,945	25,717	27,490
GA5C	78	1,290	2,613	3,879	5,145	6,411	7,677	8,943	10,209	11,476	12,742	14,008	15,274	16,540	17,806	19,072	20,338
GA6C	73	1,437	2,802	4,166	5,530	6,894	8,258	9,623	10,987	12,351	13,715	15,079	16,443	17,808	19,172	20,536	21,900
BE4W	-	440	853	1,249	1,645	2,040	2,436	2,832	3,228	3,624	4,019	4,415	4,811	5,207	5,602	5,998	6,394
GL7T	110	1,274	2,695	4,116	5,536	6,957	8,378	9,799	11,220	12,640	14,061	15,482	16,903	18,324	19,744	21,165	22,586
AN72	313	1,933	3,552	5,171	6,790	8,410	10,029	11,648	13,268	14,887	16,506	18,125	19,745	21,364	22,983	24,602	26,222
BE20	73	298	524	749	975	1,201	1,426	1,652	1,877	2,103	2,328	2,554	2,779	3,005	3,230	3,456	3,681
A225	-	16,790	34,453	52,291	70,128	87,966	105,804	123,641	141,479	155,493	166,777	178,060	189,343	200,627	211,910	223,193	234,476
AN22	462	7,231	14,001	20,771	27,541	34,311	41,081	47,851	54,620	61,390	68,160	74,930	81,700	88,470	95,240	102,009	108,779
B350	61	335	610	885	1,160	1,435	1,709	1,984	2,259	2,534	2,809	3,083	3,358	3,633	3,908	4,183	4,457
C25A	29	412	789	1,126	1,463	1,800	2,137	2,474	2,811	3,148	3,485	3,822	4,159	4,496	4,833	5,170	5,507
C510	2	321	574	785	995	1,206	1,416	1,626	1,837	2,047	2,257	2,468	2,678	2,888	3,099	3,309	3,520
C650	3	783	1,475	2,167	2,859	3,551	4,243	4,935	5,627	6,318	7,010	7,702	8,394	9,086	9,778	10,470	11,162
C680	1	759	1,518	2,276	2,924	3,511	4,099	4,686	5,273	5,861	6,448	7,035	7,623	8,210	8,797	9,384	9,972
E50P	2	329	619	857	1,095	1,333	1,572	1,810	2,048	2,287	2,525	2,763	3,002	3,240	3,478	3,717	3,955
E545	70	831	1,591	2,351	3,112	3,872	4,632	5,393	6,153	6,914	7,674	8,434	9,195	9,955	10,715	11,476	12,236
E550	8	829	1,650	2,430	3,190	3,949	4,709	5,469	6,229	6,988	7,748	8,508	9,267	10,027	10,787	11,547	12,306
HDJT	54	348	642	936	1,230	1,524	1,818	2,112	2,406	2,700	2,994	3,288	3,582	3,877	4,171	4,465	4,759
PC24	68	574	1,081	1,587	2,094	2,600	3,107	3,614	4,120	4,627	5,133	5,640	6,146	6,653	7,160	7,666	8,173

Table A-2.2.b. Aircraft types (by ICAO type designator) modelled with equivalent aircraft types

	Fuel (in kg) for given Block Time (min)																
Type Designator	0	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960
A30B	585	4,687	8,789	12,891	16,994	21,096	25,198	29,301	33,403	37,505	41,608	45,710	49,812	53,914	58,017	62,119	66,221
A338	178	3,650	8,470	13,289	18,109	22,929	27,749	33,617	39,520	45,423	51,326	57,229	63,132	69,035	74,938	80,841	86,744
A342	-	4,211	9,489	15,766	22,042	28,318	34,595	40,871	47,147	54,071	61,192	68,313	75,435	82,556	89,677	96,798	103,920
A345	-	6,394	14,088	21,783	29,478	37,172	44,867	52,562	61,706	71,235	80,764	90,293	99,822	109,351	118,880	128,409	137,938
A35K	23	5,503	11,453	17,496	23,539	29,752	37,254	44,757	52,259	59,761	67,263	74,766	82,268	89,770	97,272	104,775	112,277
B741	-	5,446	13,962	22,478	30,993	39,902	49,204	58,505	67,807	77,109	86,410	95,712	105,014	114,315	123,617	132,919	142,220
B742	-	6,022	15,439	24,855	34,272	44,123	54,408	64,694	74,979	85,265	95,550	105,836	116,121	126,407	136,693	146,978	157,264
B743	-	6,049	15,507	24,965	34,423	44,318	54,649	64,980	75,311	85,642	95,973	106,304	116,635	126,966	137,297	147,628	157,959
B74R	-	5,212	13,361	21,511	29,660	38,186	47,088	55,989	64,891	73,793	82,694	91,596	100,497	109,399	118,301	127,202	136,104
B74S	-	5,056	12,961	20,866	28,771	37,041	45,675	54,310	62,945	71,579	80,214	88,849	97,483	106,118	114,752	123,387	132,022
A19N	37	1,870	3,881	6,019	8,156	10,293	12,430	14,568	16,705	18,842	20,979	23,117	25,254	27,391	29,528	31,666	33,803
B37M	9	1,470	3,449	5,593	7,737	9,881	12,025	14,169	16,313	18,457	20,601	22,745	24,889	27,033	29,177	31,321	33,465
B39M	11	1,684	3,953	6,410	8,867	11,324	13,782	16,239	18,696	21,153	23,610	26,067	28,524	30,981	33,438	35,895	38,352
B3XM	11	1,643	3,857	6,254	8,651	11,048	13,445	15,842	18,239	20,637	23,034	25,431	27,828	30,225	32,622	35,019	37,416
MD81	167	2,711	5,426	8,312	11,199	14,086	16,973	19,859	22,746	25,633	28,519	31,406	34,293	37,180	40,066	42,953	45,840
MD83	191	3,087	6,179	9,466	12,754	16,041	19,328	22,616	25,903	29,190	32,478	35,765	39,052	42,340	45,627	48,915	52,202
B461	262	1,606	3,419	5,231	7,044	8,857	10,670	12,483	14,296	16,109	17,921	19,734	21,547	23,360	25,173	26,986	28,799
B732	232	1,753	3,879	6,005	8,131	10,257	12,383	14,509	16,635	18,761	20,887	23,013	25,139	27,266	29,392	31,518	33,644
C560	12	619	1,128	1,587	2,046	2,505	2,964	3,423	3,882	4,341	4,800	5,259	5,718	6,177	6,636	7,095	7,554
FA6X	52	1,262	2,472	3,682	4,892	6,101	7,311	8,521	9,731	10,941	12,151	13,360	14,570	15,780	16,990	18,200	19,410
GA7C	87	1,644	3,202	4,759	6,355	8,035	9,714	11,394	13,073	14,753	16,432	18,112	19,791	21,471	23,150	24,830	26,509
H25A	59	739	1,340	1,941	2,542	3,143	3,745	4,346	4,947	5,548	6,149	6,750	7,351	7,952	8,554	9,155	9,756
H25C	71	888	1,610	2,332	3,054	3,776	4,498	5,220	5,942	6,664	7,386	8,108	8,830	9,552	10,274	10,996	11,719
LJ25	-	438	821	1,182	1,542	1,902	2,262	2,622	2,982	3,342	3,702	4,062	4,423	4,783	5,143	5,503	5,863
LJ35	-	535	1,002	1,442	1,881	2,320	2,760	3,199	3,638	4,078	4,517	4,956	5,396	5,835	6,274	6,714	7,153
LJ55	43	597	1,151	1,704	2,258	2,811	3,365	3,918	4,472	5,025	5,579	6,132	6,686	7,239	7,793	8,347	8,900
LJ70	45	613	1,182	1,750	2,319	2,887	3,456	4,024	4,593	5,161	5,730	6,298	6,867	7,435	8,004	8,572	9,141
RJ1H	169	1,989	3,809	5,629	7,449	9,269	11,089	12,909	14,729	16,549	18,369	20,189	22,009	23,829	25,649	27,469	29,289
RJ70	358	1,933	3,508	5,082	6,657	8,232	9,806	11,381	12,955	14,530	16,105	17,679	19,254	20,829	22,403	23,978	25,552
AN30	4	890	1,776	2,661	3,441	4,026	4,610	5,194	5,778	6,362	6,947	7,531	8,115	8,699	9,283	9,868	10,452
AN32	5	1,045	2,084	3,124	4,040	4,726	5,412	6,097	6,783	7,469	8,155	8,841	9,526	10,212	10,898	11,584	12,270
AT73	28	554	1,079	1,605	2,131	2,657	3,183	3,708	4,234	4,760	5,286	5,812	6,337	6,863	7,389	7,915	8,441
DH8B	6	502	1,039	1,589	2,139	2,689	3,238	3,788	4,338	4,888	5,437	5,987	6,537	7,087	7,637	8,186	8,736
DH8C	7	592	1,226	1,875	2,523	3,172	3,820	4,469	5,117	5,766	6,414	7,063	7,711	8,360	9,008	9,657	10,306
DHC7	7	616	1,275	1,950	2,624	3,299	3,973	4,648	5,322	5,997	6,672	7,346	8,021	8,695	9,370	10,044	10,719

Table A-2.2.c. Aircraft types (by ICAO type designator) modelled with an ICAO Fuel Formula

	Fuel (in kg) for given Block Time (min)																
Type Designator	0	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960
DC10	3,297	7,887	12,476	17,066	21,655	26,245	31,309	36,660	42,010	47,361	52,711	58,062	63,412	74,113	85,021	96,583	108,145
DC85	3,118	6,126	9,135	12,143	15,152	18,160	21,169	24,177	27,186	30,194	33,203	36,211	39,220	45,237	51,254	57,271	63,288
DC86	3,118	6,126	9,135	12,143	15,152	18,160	21,169	24,177	27,186	30,194	33,203	36,211	39,220	45,237	51,254	57,271	63,288
DC87	3,118	6,126	9,135	12,143	15,152	18,160	21,169	24,177	27,186	30,194	33,203	36,211	39,220	45,237	51,254	57,271	63,288
IL62	2,656	6,827	10,997	15,168	19,338	23,509	27,679	31,850	36,020	40,191	44,361	48,532	52,702	61,043	69,384	77,725	86,066
IL76	7,415	11,716	16,018	20,749	25,845	30,941	36,037	41,133	46,229	51,325	56,421	61,517	66,613	76,805	86,997	97,189	107,381
IL86	7,365	12,963	18,561	24,159	29,757	35,427	41,154	46,882	52,609	58,337	64,064	69,792	75,519	86,974	98,429	109,884	121,339
IL96	2,477	7,237	11,998	16,758	21,519	26,279	31,040	35,800	40,561	45,321	50,082	54,842	59,603	69,124	78,645	88,166	97,492
L101	2,733	7,649	12,566	17,482	22,399	27,315	32,232	37,148	42,065	46,981	51,898	57,340	63,066	74,518	85,970	97,422	108,874
B701	2,632	6,027	9,421	12,816	16,210	19,605	22,999	26,394	29,594	32,680	35,766	38,852	41,938	48,110	54,282	60,454	66,626
B721	1,520	3,586	5,651	7,717	9,782	11,848	13,788	15,716	17,644	19,572	21,500	23,428	25,356	29,212	33,068	36,924	40,780
T134	2,065	3,584	5,104	6,623	8,142	9,662	11,181	12,701	14,220	15,740	17,259	18,779	20,298	23,337	26,376	29,415	32,454
T154	2,805	5,809	8,813	11,817	14,821	17,825	20,734	23,594	26,453	29,313	32,172	35,032	37,891	43,610	49,329	55,048	60,767
T204	2,801	5,806	8,812	11,817	14,823	17,828	20,734	23,594	26,453	29,313	32,172	35,032	37,891	43,610	49,329	55,048	60,767
A148	783	1,732	2,681	3,630	4,579	5,528	6,477	7,427	8,376	9,325	10,274	11,223	12,172	14,071	15,969	17,867	19,766
BA11	558	2,209	3,861	5,512	7,164	8,815	10,467	12,118	13,770	15,421	17,073	18,724	20,376	23,679	27,865	32,265	36,665
DC91	685	2,234	3,784	5,333	6,883	8,432	9,982	11,531	13,081	14,630	16,180	17,729	19,279	22,526	25,823	29,120	32,417
DC92	693	2,262	3,830	5,399	6,967	8,536	10,104	11,673	13,241	14,810	16,378	17,947	19,515	22,806	26,144	29,482	32,820
DC93	741	2,418	4,095	5,772	7,449	9,126	10,803	12,480	14,157	15,834	17,511	19,188	20,865	24,377	27,945	31,513	35,081
DC94	796	2,596	4,397	6,197	7,998	9,798	11,599	13,399	15,200	17,000	18,801	20,601	22,402	26,174	30,005	33,836	37,667
F28	419	2,221	3,404	4,588	5,771	6,955	8,138	9,322	10,505	11,689	12,872	14,056	15,239	17,606	19,973	22,340	24,707
FA10	159	844	1,293	1,743	2,192	2,642	3,091	3,541	3,990	4,440	4,889	5,339	5,788	6,687	7,586	8,485	9,384
J328	183	968	1,484	2,000	2,516	3,032	3,548	4,064	4,580	5,096	5,612	6,128	6,644	7,676	8,708	9,740	10,772
S601	184	407	630	853	1,076	1,299	1,522	1,745	1,968	2,191	2,414	2,637	2,860	3,307	3,753	4,199	4,645
WW24	122	646	990	1,334	1,678	2,022	2,366	2,710	3,054	3,398	3,742	4,086	4,430	5,118	5,806	6,494	7,182
YK40	171	906	1,389	1,872	2,355	2,838	3,321	3,804	4,287	4,770	5,253	5,736	6,219	7,185	8,151	9,117	10,083
YK42	703	3,514	5,076	6,638	8,200	9,762	11,324	12,886	14,448	16,010	17,572	19,134	20,696	23,820	26,944	30,068	33,192
A140	314	963	1,612	2,261	2,909	3,558	4,207	4,856	5,505	6,153	6,802	7,451	8,100	9,397	10,695	11,993	13,290
A748	321	982	1,644	2,306	2,968	3,629	4,291	4,953	5,615	6,276	6,938	7,600	8,262	9,585	10,909	12,232	13,556
AN12	1,262	3,335	5,408	7,482	9,555	11,629	13,702	15,776	17,849	19,923	21,996	24,069	26,143	30,290	34,437	38,584	42,731
AN24	433	1,135	1,837	2,539	3,241	3,943	4,645	5,347	6,049	6,751	7,452	8,154	8,856	10,260	11,664	13,068	14,471
AN28	157	482	806	1,130	1,455	1,779	2,104	2,428	2,752	3,077	3,401	3,726	4,050	4,699	5,348	5,996	6,645
ATP	282	865	1,447	2,029	2,612	3,194	3,777	4,359	4,942	5,524	6,107	6,689	7,272	8,436	9,601	10,766	11,931
BELF	397	3,910	6,502	9,094	11,686	14,278	16,870	19,462	22,054	24,646	27,238	29,830	32,422	37,606	42,790	47,974	53,158
C130	869	2,664	4,459	6,254	8,049	9,844	11,639	13,434	15,229	17,024	18,819	20,614	22,409	25,999	29,589	33,179	36,769
C212	138	423	707	992	1,277	1,562	1,846	2,131	2,416	2,701	2,985	3,270	3,555	4,124	4,694	5,263	5,833
CN35	210	642	1,075	1,507	1,940	2,372	2,805	3,237	3,670	4,102	4,535	4,968	5,400	6,265	7,130	7,995	8,861
CVLP	20	1,294	1,856	2,418	2,980	3,542	4,104	4,666	5,228	5,790	6,352	6,914	7,476	8,600	9,724	10,848	11,972
CVLT	20	1,294	1,856	2,418	2,980	3,542	4,104	4,666	5,228	5,790	6,352	6,914	7,476	8,600	9,724	10,848	11,972
D228	115	353	590	828	1,065	1,303	1,540	1,778	2,015	2,253	2,491	2,728	2,966	3,441	3,916	4,391	4,866
DC3	6	397	569	742	914	1,087	1,259	1,432	1,604	1,777	1,949	2,122	2,294	2,639	2,984	3,329	3,674
DC6	22	1,412	2,026	2,639	3,253	3,866	4,480	5,093	5,707	6,320	6,934	7,547	8,161	9,388	10,615	11,842	13,069
DHC6	26	366	608	851	1,093	1,336	1,578	1,821	2,063	2,306	2,548	2,791	3,033	3,518	4,003	4,488	4,973
E110	35	342	569	796	1,023	1,250	1,477	1,704	1,931	2,158	2,385	2,612	2,839	3,293	3,747	4,201	4,655
E120	169	539	909	1,279	1,649	2,019	2,389	2,759	3,129	3,499	3,869	4,239	4,609	5,349	6,089	6,829	7,569
F27	48	1,048	1,743	2,438	3,133	3,828	4,523	5,218	5,913	6,608	7,303	7,998	8,693	10,083	11,473	12,863	14,253
G159	90	977	1,625	2,273	2,921	3,569	4,217	4,865	5,513	6,161	6,809	7,457	8,105	9,401	10,697	11,993	13,289
I114	113	1,195	1,987	2,779	3,571	4,363	5,155	5,947	6,739	7,531	8,323	9,115	9,907	11,491	13,075	14,659	16,243
IL18	890	2,729	4,567	6,405	8,243	10,082	11,920	13,758	15,596	17,435	19,273	21,111	22,949	26,626	30,302	33,979	37,655
JS31	120	369	618	867	1,115	1,364	1,613	1,861	2,110	2,359	2,607	2,856	3,105	3,602	4,100	4,597	5,094
JS32	129	394	659	924	1,190	1,455	1,720	1,986	2,251	2,516	2,782	3,047	3,312	3,843	4,373	4,904	5,435
JS41	177	544	910	1,276	1,642	2,008	2,375	2,741	3,107	3,473	3,839	4,206	4,572	5,304	6,037	6,769	7,501
L188	287	3,149	5,236	7,324	9,411	11,499	13,586	15,674	17,761	19,849	21,936	24,024	26,111	30,286	34,461	38,636	42,811
L410	49	434	722	1,010	1,298	1,586	1,874	2,162	2,450	2,738	3,026	3,314	3,602	4,178	4,754	5,330	5,906
N262	132	404	677	949	1,222	1,494	1,767	2,039	2,312	2,584	2,857	3,129	3,402	3,947	4,492	5,037	5,582
SC7	87	267	448	628	808	988	1,168	1,349	1,529	1,709	1,889	2,069	2,250	2,610	2,970	3,331	3,691
SH33	166	508	850	1,193	1,535	1,877	2,219	2,562	2,904	3,246	3,588	3,931	4,273	4,957	5,642	6,326	7,011
SH36	177	544	910	1,276	1,642	2,008	2,375	2,741	3,107	3,473	3,839	4,206	4,572	5,304	6,037	6,769	7,501
SW2	124	380	636	892	1,148	1,403	1,659	1,915	2,171	2,427	2,683	2,939	3,195	3,707	4,218	4,730	5,242
YS11	87	958	1,593	2,228	2,863	3,498	4,133	4,768	5,403	6,038	6,673	7,308	7,943	9,213	10,483	11,753	13,023

APPENDIX A-3: Aircraft types (by type designator) that will be the focus of further and targeted data collection towards the 2026 version of the ICAO CORSIA CERT

As described above in this document, the CO_2 Estimation Models (CEMs) are developed using flight level data provided by aeroplane operators (AO based data). The CAEP continuously strive to increase the scope and accuracy of CEMs towards future versions of the CERT. The list below presents the aircraft types that will be the focus of further and targeted data collection towards the 2026 version of the ICAO CORSIA CERT. Aeroplane operators and/or data providing organization interested in contributing to future improvements of the CERT are welcome to contact cert@icao.int.

Type Designator	Manufacturer	**Example of Model**
A35K	Airbus	A-350-1000 XWB
B39M	Boeing	737 Max 9
A338	Airbus	A-330-800
SU95	Sukhoi	Superjet 100-95
B742	Boeing	747-200
T204	Tupolev	Tu-204
BLCF	Boeing	747-400LCF
GA7C	Gulfstream Aerospace	G700
A337	Airbus	A-330-700
MD83	Boeing	MD-83
C700	Cessna	700 Citation Longitude
A342	Airbus	A-340-200
A19N	Airbus	A-319neo
G200	Gulfstream Aerospace	G200
IL96	Ilyushin	Il-96
BE40	Beech	400
A345	Airbus	A-340-500
LJ35	Gates Learjet	LJ35
C560	Cessna	Cessna Citation V
RJ1H	Avro	Avroliner (RJ-100)
FA6X	Dassault	Falcon 6X
G150	Gulfstream Aerospace	Gulfstream G150
B732	Boeing	737-200
A30B	Airbus	A300B2-200

APPENDIX B-1: Complementary List of Aerodromes Towards the CERT Aerodrome Database

ICAO Code	Airport Name	Latitude	Longitude	Terr_Code	ICAO Member State	Link for confirmation
MYGW	West End Airport	26.69	-78.97	MY	Bahamas	https://www.google.com/maps/search/26.69,-78.97
MYPI	Nassau Paradise Island Airport	25.08	-77.30	MY	Bahamas	https://www.google.com/maps/search/25.08,-77.3
SBJH	Sao Paulo Catarina Aeroporto Executivo - International	-23.43	-47.17	SB	Brazil	https://www.google.com/maps/search/-23.43,-47.17
SDSC	Sao Carlos International Airport	-21.88	-47.90	SD	Brazil	https://www.google.com/maps/search/-21.88,-47.9
VDSA	Siem Reap-Angkor International Airport	13.37	104.22	VD	Cambodia	https://www.google.com/maps/search/13.37,104.22
CBS8	Alberni Valley Regional Airport	49.32	-124.93	CB	Canada	https://www.google.com/maps/search/49.32,-124.93
CCR3	Florenceville Airport	46.43	-67.63	CC	Canada	https://www.google.com/maps/search/46.43,-67.63
CFH4	Fox Harbour Airport	45.87	-63.46	CF	Canada	https://www.google.com/maps/search/45.87,-63.46
CNK4	Parry Sound Area Municipal Airport	45.26	-79.83	CN	Canada	https://www.google.com/maps/search/45.26,-79.83
CJW5	Russell Airport	50.77	-101.29	CJ	Canada	https://www.google.com/maps/search/50.77,-101.29
CNP3	Arnprior Airport	45.41	-76.37	CN	Canada	https://www.google.com/maps/search/45.41,-76.37
CNY3	Collingwood Airport	44.45	-80.16	CN	Canada	https://www.google.com/maps/search/44.45,-80.16
CSM3	Thetford Mines Airport	46.05	-71.26	CS	Canada	https://www.google.com/maps/search/46.05,-71.26
CTG3	Du Rocher-Percé (Pabok) Airport	48.38	-64.56	CT	Canada	https://www.google.com/maps/search/48.38,-64.56
CEH6	Provost Airport	52.34	-110.28	CE	Canada	https://www.google.com/maps/search/52.34,-110.28
CAH4	Valemount Airport	52.85	-119.33	CA	Canada	https://www.google.com/maps/search/52.85,-119.33
CSC3	Drummondville Airport	45.85	-72.39	CS	Canada	https://www.google.com/maps/search/45.85,-72.39
CCQ3	Debert Airport	45.42	-63.46	CC	Canada	https://www.google.com/maps/search/45.42,-63.46
CDA4	Pokemouche Airport	47.72	-64.88	CD	Canada	https://www.google.com/maps/search/47.72,-64.88
CCN2	Grand Manan Airport	44.71	-66.80	CC	Canada	https://www.google.com/maps/search/44.71,-66.8
CFH4	Fox Harbour Airport	45.87	-63.46	CF	Canada	https://www.google.com/maps/search/45.87,-63.46
ZHEC	Ezhou Huahu Airport	30.34	115.04	ZH	China	https://www.google.com/maps/search/30.34,115.04
ZUTF	Chengdu/Tianfu	30.31	104.44	ZU	China	https://www.google.com/maps/search/30.31,104.44
HECW	Cairo West Air Base	30.11	30.92	HE	Egypt	https://www.google.com/maps/search/30.11,30.92
HEMK	Moubarak / International	26.34	31.74	HE	Egypt	https://www.google.com/maps/search/26.34,31.74
SYGO	Ogle International Airport	6.81	-58.11	SY	Guyana	https://www.google.com/maps/search/6.81,-58.11
MHSC	Comayagua International Airport	14.38	-87.62	MH	Honduras	https://www.google.com/maps/search/14.38,-87.62

ICAO Code	Airport Name	Latitude	Longitude	Terr_Code	ICAO Member State	Link for confirmation
VOGA	Manohar International Airport	15.74	73.86	VO	India	https://www.google.com/maps/search/15.74,73.86
VAGO	Goa	15.38	73.83	VA	India	https://www.google.com/maps/search/15.38,73.83
VIBN	Lal Bahadur Shastri/Varanasi Domestic	25.45	82.86	VI	India	https://www.google.com/maps/search/25.45,82.86
WARQ	Adisumarmo International Airport	-7.52	110.76	WA	Indonesia	https://www.google.com/maps/search/-7.52,110.76
WIPT	Padang Pariaman/Minangkabau	-0.79	100.28	WI	Indonesia	https://www.google.com/maps/search/-0.79,100.28
UAIT	Turkistan	43.31	68.55	UA	Kazakhstan	https://www.google.com/maps/search/43.31,68.55
HKSA	Embakasi Airport	-1.30	36.92	HK	Kenya	https://www.google.com/maps/search/-1.3,36.92
UAFL	Tamchy/Ysykkul	42.59	76.70	UA	Kyrgyzstan	https://www.google.com/maps/search/42.59,76.7
UAFM	Bishkek/Manas	43.06	74.48	UA	Kyrgyzstan	https://www.google.com/maps/search/43.06,74.48
UAFO	Osh	40.61	72.79	UA	Kyrgyzstan	https://www.google.com/maps/search/40.61,72.79
VREI	Ifuru Island/Airport	5.71	73.03	VR	Maldives	https://www.google.com/maps/search/5.71,73.03
GQPF	Fderik Airport	22.67	-12.73	GQ	Mauritania	https://www.google.com/maps/search/22.67,-12.73
MMTL	Felipe Carrillo Puerto International Airport	20.17	-87.66	MM	Mexico	https://www.google.com/maps/search/20.17,-87.66
MMIM	Isla Mujeres	21.25	-86.74	MM	Mexico	https://www.google.com/maps/search/21.25,-86.74
MNMG	Augusto C. Sandino (Managua) International Airport	12.14	-86.17	MN	Nicaragua	https://www.google.com/maps/search/12.14,-86.17
OPRN	Islamabad/ Benazir Bhutto International	33.62	73.10	OP	Pakistan	https://www.google.com/maps/search/33.62,73.1
MPHO	Howard International	8.91	-79.60	MP	Panama	https://www.google.com/maps/search/8.91,-79.6
MPRH	Scarlett Martinez International Airport	8.38	-80.13	MP	Panama	https://www.google.com/maps/search/8.38,-80.13
UUMU	Chkalovskiy Air Base	55.88	38.06	UU	Russian Federation	https://www.google.com/maps/search/55.88,38.06
TKPN	Vancew.Amoryinternational_Airport	17.20	-62.59	TK	Saint Kitts and Nevis	https://www.google.com/maps/search/17.2,-62.59
OERY	Riyadh / King Salman Air Base	24.73	46.72	OE	Saudi Arabia	https://www.google.com/maps/search/24.73,46.72
HCMF	Bosaso International	11.28	49.14	HC	Somalia	https://www.google.com/maps/search/11.28,49.14
HCMH	Hargeisa/Egal International	9.51	44.08	HC	Somalia	https://www.google.com/maps/search/9.51,44.08
HCMM	Mogadishu/Aden Adde International Airport	2.01	45.30	HC	Somalia	https://www.google.com/maps/search/2.01,45.3
HSWW	Wau Airport	7.73	27.98	HS	South Sudan	https://www.google.com/maps/search/7.73,27.98
HSSJ	Juba	4.88	31.59	HS	South Sudan	https://www.google.com/maps/search/4.88,31.59
HSSK	Khartoum	15.59	32.55	HS	Sudan	https://www.google.com/maps/search/15.59,32.55
LTDB	Cukurova	36.90	35.07	LT	Türkiye	https://www.google.com/maps/search/36.9,35.07
LTFO	Rize-Artvin	41.18	40.85	LT	Türkiye	https://www.google.com/maps/search/41.18,40.85
TJRV	José Aponte De La Torre Airport	18.25	-65.64	TJ	United States	https://www.google.com/maps/search/18.25,-65.64

ICAO Code	Airport Name	Latitude	Longitude	Terr_Code	ICAO Member State	Link for confirmation
KJQF	Concord-Padgett Regional Airport	35.39	-80.71	KJ	United States	https://www.google.com/maps/search/35.39,-80.71
KBVS	Skagit Regional Airport	48.47	-122.42	KB	United States	https://www.google.com/maps/search/48.47,-122.42
KORS	Orcas Island Airport	48.71	-122.91	KO	United States	https://www.google.com/maps/search/48.71,-122.91
KJPX	East Hampton Town Airport	40.96	-72.25	KJ	United States	https://www.google.com/maps/search/40.96,-72.25
KMWK	Mount Airy/Surry County Airpor	36.46	-80.55	KM	United States	https://www.google.com/maps/search/36.46,-80.55
KSCA	Sidney City Airport	40.24	-84.15	KS	United States	https://www.google.com/maps/search/40.24,-84.15
KBVU	Boulder City Municipal Airport	35.95	-114.86	KB	United States	https://www.google.com/maps/search/35.95,-114.86
KCHD	Chandler Municipal Airport	33.27	-111.81	KC	United States	https://www.google.com/maps/search/33.27,-111.81
KTTA	Raleigh Executive Jetport At Sanford-Lee County Airport	35.58	-79.10	KT	United States	https://www.google.com/maps/search/35.58,-79.1
KBUY	Burlington Alamance Regional Airport	36.05	-79.47	KB	United States	https://www.google.com/maps/search/36.05,-79.47
KFFZ	Falcon Field Airport	33.46	-111.73	KF	United States	https://www.google.com/maps/search/33.46,-111.73
KVNC	Venice Municipal Airport	27.07	-82.44	KV	United States	https://www.google.com/maps/search/27.07,-82.44
KPVG	Hampton Roads Executive Airport	36.78	-76.45	KP	United States	https://www.google.com/maps/search/36.78,-76.45
KANE	Anoka County-Blaine Airport (Janes Field)	45.15	-93.21	KA	United States	https://www.google.com/maps/search/45.15,-93.21
KJYR	York Municipal Airport	40.90	-97.62	KJ	United States	https://www.google.com/maps/search/40.9,-97.62
KRGK	Red Wing Regional General Airport Information	44.59	-92.49	KR	United States	https://www.google.com/maps/search/44.59,-92.49
KEKM	Elkhart Municipal Airport	41.72	-86.00	KE	United States	https://www.google.com/maps/search/41.72,-86
KP08	Coolidge Municipal Airport	32.94	-111.43	KP	United States	https://www.google.com/maps/search/32.94,-111.43
KEVB	New Smyrna Beach Municipal Airport	29.06	-80.95	KE	United States	https://www.google.com/maps/search/29.06,-80.95
KHBI	Asheboro Regional Airport	35.65	-79.89	KH	United States	https://www.google.com/maps/search/35.65,-79.89
KFHR	Friday Harbor Airport	48.52	-123.02	KF	United States	https://www.google.com/maps/search/48.52,-123.02
KANJ	Sault Ste Marie Muni/Sanderson Field	46.48	-84.37	KA	United States	https://www.google.com/maps/search/46.48,-84.37
KBKV	Brooksville-Tampa Bay Regional	28.47	-82.46	KB	United States	https://www.google.com/maps/search/28.47,-82.46
KDTO	Denton Enterprise	33.20	-97.20	KD	United States	https://www.google.com/maps/search/33.2,-97.2
KDTS	Destin Executive	30.40	-86.47	KD	United States	https://www.google.com/maps/search/30.4,-86.47
KGYH	Donaldson Field	34.76	-82.38	KG	United States	https://www.google.com/maps/search/34.76,-82.38
KHEF	Manassas Regional/Harry P Davis Field	38.72	-77.52	KH	United States	https://www.google.com/maps/search/38.72,-77.52
KHXD	Hilton Head	32.22	-80.70	KH	United States	https://www.google.com/maps/search/32.22,-80.7
KHYI	San Marcos Regional	29.89	-97.86	KH	United States	https://www.google.com/maps/search/29.89,-97.86
KJYO	Leesburg Executive	39.08	-77.56	KJ	United States	https://www.google.com/maps/search/39.08,-77.56

ICAO Code	Airport Name	Latitude	Longitude	Terr_Code	ICAO Member State	Link for confirmation
KJZI	Charleston Executive	32.70	-80.00	KJ	United States	https://www.google.com/maps/search/32.7,-80
KMKY	Marco Island Executive	26.00	-81.67	KM	United States	https://www.google.com/maps/search/26,-81.67
KPMP	Pompano Beach Airpark	26.25	-80.11	KP	United States	https://www.google.com/maps/search/26.25,-80.11
KSUT	Cape Fear Regional Jetport/Howie Franklin Field	33.93	-78.07	KS	United States	https://www.google.com/maps/search/33.93,-78.07
KTKI	Mckinney Ntl	33.18	-96.59	KT	United States	https://www.google.com/maps/search/33.18,-96.59
KTME	Houston Executive	29.81	-95.90	KT	United States	https://www.google.com/maps/search/29.81,-95.9
KTYQ	Indianapolis Executive	40.03	-86.25	KT	United States	https://www.google.com/maps/search/40.03,-86.25
KUZA	Rock Hill/York County/Bryant Field	34.99	-81.06	KU	United States	https://www.google.com/maps/search/34.99,-81.06
UTKF	Fergana International Airport	40.36	71.75	UT	Uzbekistan	https://www.google.com/maps/search/40.36,71.75
UTKN	Namangan Airport	40.98	71.56	UT	Uzbekistan	https://www.google.com/maps/search/40.98,71.56
FLLI	Livingstone	-17.82	25.82	FL	Zambia	https://www.google.com/maps/search/-17.82,25.82
FLLS	Kenneth Kaunda International	-15.33	28.45	FL	Zambia	https://www.google.com/maps/search/-15.33,28.45
FLND	Ndola Airport	-13.00	28.66	FL	Zambia	https://www.google.com/maps/search/-13,28.66
FVBU	Bulawayo/Joshua Mqabuko Nkomo International	-20.02	28.62	FV	Zimbabwe	https://www.google.com/maps/search/-20.02,28.62

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