

# ICAO CORSIA CO<sub>2</sub> Estimation and Reporting Tool (CERT)

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## INTRODUCTION

In an international aviation world where CORSIA is now a reality and where all aeroplane operators are requested to undertake their CO<sub>2</sub> emissions monitoring, the ICAO CORSIA CO<sub>2</sub> Estimation and Reporting Tool (CERT) was developed to provide practical support to users to facilitate their compliance with the CORSIA monitoring, reporting and verification requirements.

CORSIA CO<sub>2</sub> emissions information from aeroplane operators can be obtained either based on actual fuel burn converted to CO<sub>2</sub> emissions or estimated CO<sub>2</sub> emissions generated by the ICAO CORSIA CERT (under certain conditions<sup>1</sup>). Monitoring CO<sub>2</sub> emissions can be challenging if no monitoring system is yet implemented. In a simplified manner, the ICAO CORSIA CERT allows for the monitoring of CO<sub>2</sub> emissions with minimum information to be provided, such as the aeroplane type, an aerodrome pair and the number of flights.

The ICAO CORSIA CERT is a versatile tool. In addition to estimating the CO<sub>2</sub> emissions, each aeroplane operator can generate a summary assessment detailing its specific situation. In addition, from 2019, with the introduction of the 2019 version of the ICAO CORSIA CERT, all aeroplane operators may also generate a complete Emissions Report.

This article aims to introduce the ICAO CORSIA CERT in detail – by providing information on the ICAO CORSIA CERT use eligibility, on the development of the tool and how the tool works – but mainly by demonstrating how a complex task

such as the CO<sub>2</sub> emissions monitoring becomes so easy thanks to the ICAO CORSIA CERT.

## AEROPLANE OPERATORS ELIGIBLE TO USE THE ICAO CORSIA CERT AND FUNCTIONALITIES

**Eligibility** – The use of the ICAO CORSIA CERT depends on the level of emissions. All aeroplane operators can use the tool with no restrictions for a preliminary CO<sub>2</sub> assessment. The summary assessment indicates if the aeroplane operator is under the scope of applicability of CORSIA (i.e. if its annual international CO<sub>2</sub> emissions are greater than 10,000 tonnes of CO<sub>2</sub>). Furthermore, the summary assessment also indicates if the aeroplane operator is eligible to use simplified compliance procedures. If so, the aeroplane operator may use the ICAO CORSIA CERT as a primary monitoring method, at the condition that its annual international emissions are between 10,000 and 500,000 tonnes of CO<sub>2</sub> for the period 2019-2020 and between 10,000 and 50,000 tonnes

**TABLE 1:** Aeroplane Operators Eligible to Use the ICAO CORSIA CERT

CERT	Aeroplane Operators International CO <sub>2</sub> Emissions (tonnes) 2019 – 2020*		
	≤ 10K CO <sub>2</sub>	< 500K CO <sub>2</sub>	≥ 500K CO <sub>2</sub>
Function / Use			
Preliminary CO <sub>2</sub> Assessment	✓	✓	✓
CO <sub>2</sub> Estimation & Reporting	No CORSIA requirement	✓	Not Eligible to use CERT **
Filling Data Gaps	No CORSIA requirement	✓	✓

\* Note: from 2021-2035 operators can use ICAO CORSIA CERT to estimate and report emissions if their annual emissions from international flights subject to offsetting requirement are < 50 000 tonnes of CO<sub>2</sub> annually.  
 \*\* Note: If an Aeroplane Operator uses ICAO CORSIA CERT for 2019 CO<sub>2</sub> estimation and reporting (based on their preliminary CO<sub>2</sub> assessment) but exceeds the threshold of 500 000 tonnes in 2019, the State could permit the operator to continue to use ICAO CORSIA CERT during 2020.

1 See the “Aeroplane operators eligible to use the ICAO CORSIA CERT and functionalities” section of this article for more information on conditions

of CO<sub>2</sub> emissions subject to offsetting requirements in 2021 and onward.

Finally, all aeroplane operators with CORSIA requirement can use the ICAO CORSIA CERT for filling data gaps and for populating the Emissions Report template.

The following table summarizes the use of the ICAO CORSIA CERT by aeroplane operators based on their level of international CO<sub>2</sub> emissions.

**Functionalities** – Over time, new functionalities will be added to the ICAO CORSIA CERT. Since 2018, the tool has offered the possibility for aeroplane operators to estimate their international CO<sub>2</sub> emissions for the determination of simplified compliance procedure eligibility. This version also includes the generation of a summary assessment that may be used as a supporting document for the Emissions Monitoring Plan to be submitted by aeroplane operators to the State to which they are attributed.

From 2019 onward, the tool includes the monitoring and reporting functionalities. The estimation of the CO<sub>2</sub> emissions is based either on Great Circle Distance (GCD) or Block Time (BT).

Finally, from 2021, the list of State pairs subject to offsetting requirements will be added and updated once a year.

## DEVELOPMENT OF THE ICAO CORSIA CERT

Every year, a new version of the ICAO CORSIA CERT will be developed. The methodology that underpins the ICAO CORSIA CERT will be updated every single year, in order to increase the number of aircraft types covered by the tool, especially the new generation of aircraft entering the market, and to reflect changes in term of fuel efficiencies that may happen over time. Depending on the year, new functionalities may also be added.

In order to support aeroplane operators eligible to use the ICAO CORSIA CERT as a primary monitoring method, ICAO needs support from operators with sophisticated IT systems monitoring their fuel use.

Data Providing Organizations (DPOs), working with ICAO, collect actual fuel burn data from operators and provide that data to the CORSIA CERT Group (CCG), which is a subgroup of Working Group 4 in the Committee on Aviation Environmental Protection (CAEP). All data collected are then consolidated into a database called the CCG Operations and Fuel database (COFdb).

From this database, CCG generates the ICAO CO<sub>2</sub> Estimation Models (or CEMs). In other words, the ICAO CEMs are a set of coefficients used in a formula allowing the estimation of fuel burn for each aircraft type based either on the distance flown or on block time.

After this crucial step, the ICAO CEMs are reviewed by an independent group of experts and in parallel, the ICAO CORSIA CERT, as a tool, is developed. Then, the tool and its technical document are finalized and are both submitted for recommendation to CAEP. If CAEP recommends the release of the ICAO CORSIA CERT, then the tool is submitted to the Council for adoption.

Once the ICAO CORSIA CERT is adopted, the tool and all related-documentations are made available on the ICAO CORSIA website.

Finally, the ICAO CORSIA CERT as a standalone application can be downloaded and used by aeroplane operators eligible to use the ICAO CORSIA CERT and the ICAO CEMs can also be downloaded and integrated into the IT systems of operators, States, Verifiers or Third Party organizations for the purpose of CORSIA implementation.

This cycle, shown in Figure 1, is repeated every year.

## HOW DOES THE ICAO CORSIA CERT WORK?

**Brief explanation** – The ICAO CORSIA CERT is a very simple tool to use and, starting with the 2019 version, comprises a three-step-process. The first step requires the user to enter the aeroplane operator's information such as the name, the address or the aircraft identification of the operator. The second step is dedicated to the CO<sub>2</sub> estimation by entering an aircraft type, an airport-pair and the number of flights if the estimation is based on Great

Circle Distance (GCD). In the case of using Block Time (BT) as input, the total block time per airport pairs is required. The last step is the generation of the summary assessment report if the ICAO CORSIA CERT is used for assessing the eligibility to use the tool as monitoring method, or the generation of the complete Emissions Report ready to be submitted to verification bodies and States.

**Detailed explanation** – This section will explain how CO<sub>2</sub> emissions are estimated in more detail. The ICAO CORSIA CERT uses the following equations depending on the inputs (i.e. Great Circle Distance or Block Time):

$$\text{Fuel Burn (kg)} = \text{Intercept (kg)} + \text{Slope (kg/km)} * \text{Distance (km)}$$

$$\text{Fuel Burn (kg)} = \text{Intercept (kg)} + \text{Slope (kg/min)} * \text{Block Time (min)}$$

The intercept represents the fuel burn at 0 km or 0 min, depending if Great Circle Distance or Block Time is used, and the slope represents the fuel rate in kilogram either per kilometer flown or minutes. The intercepts and slopes are the coefficients contained in the ICAO CO<sub>2</sub> Estimation Models (CEMs).

The estimation of the CO<sub>2</sub> emissions follows a two-step process. The first step is to estimate the GCD and identify the scope of applicability and the second step will use

the information generated in the first step to estimate the CO<sub>2</sub> emissions.

Figure 2 illustrates how the ICAO CORSIA CERT calculates the GCD. The tool will start by checking if aerodromes entered are in the ICAO Doc 7910 – *Location Indicators* which is embedded into the tool. If both aerodromes are available then the tool computes the GCD with the coordinates available in Doc 7910, uses the same document to identify the State where the aerodromes are located, highlights if the flight is subject to the scope of applicability of CORSIA (i.e. international flight) and, from 2021, if the flight is subject to offsetting requirements. If one or both aerodromes are missing then the user has to provide information on each aerodrome by entering the name, the latitude and the longitude of the aerodrome plus the name of the State where it is located. In the same manner, the tool then computes the GCD with the latitudes and longitudes provided and identifies the scope of applicability of the flight in the CORSIA scheme.

If Block Time input is provided instead of Great Circle Distance input, the ICAO CORSIA CERT will only use the Doc7910 for identifying the scope of applicability and the user would need to provide the BT information as input.

**FIGURE 1:** Development of the ICAO CORSIA CERT

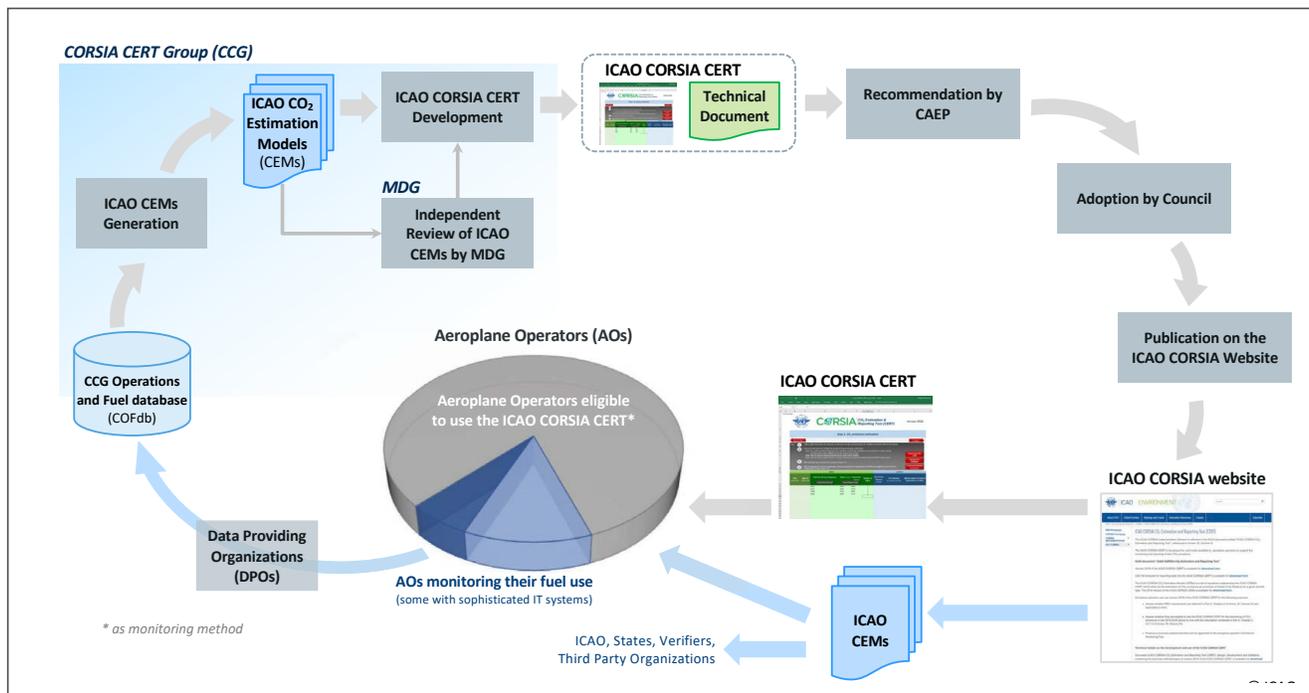


FIGURE 2: Estimation of the CO<sub>2</sub> Emissions with the ICAO CORSIA CERT – Step 1

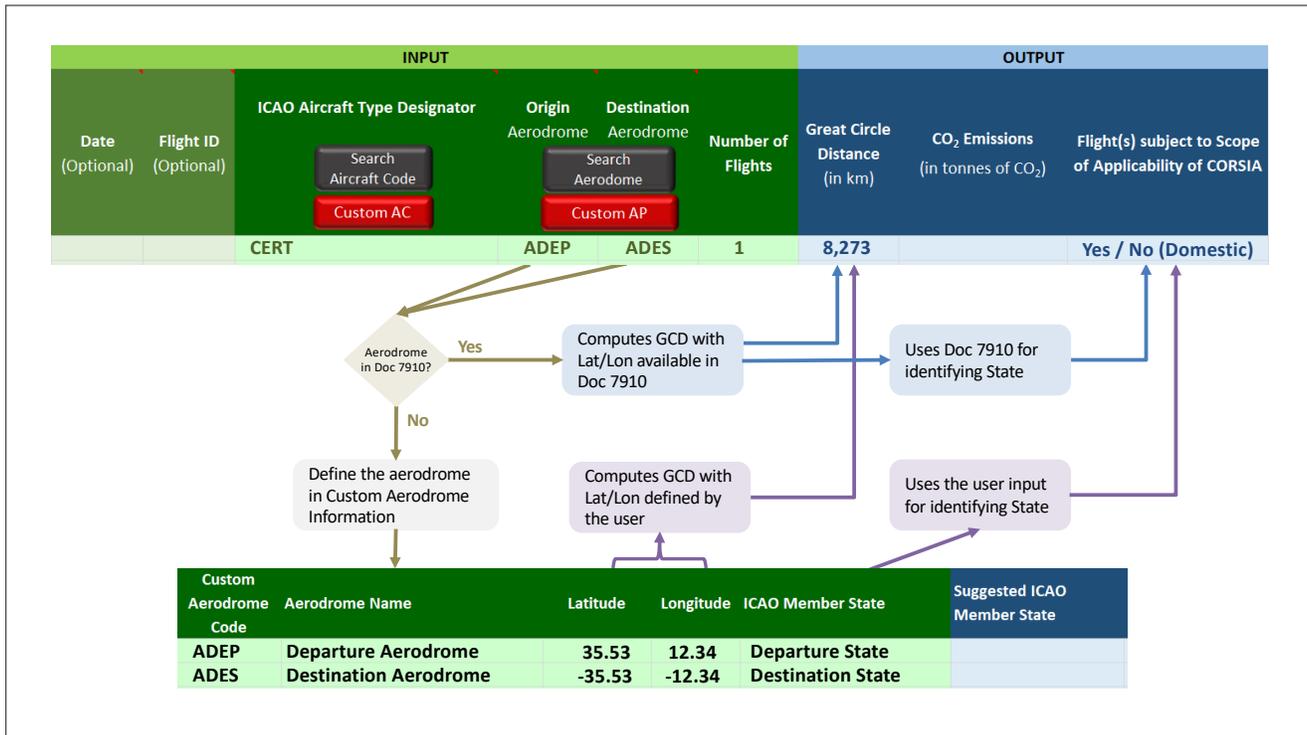
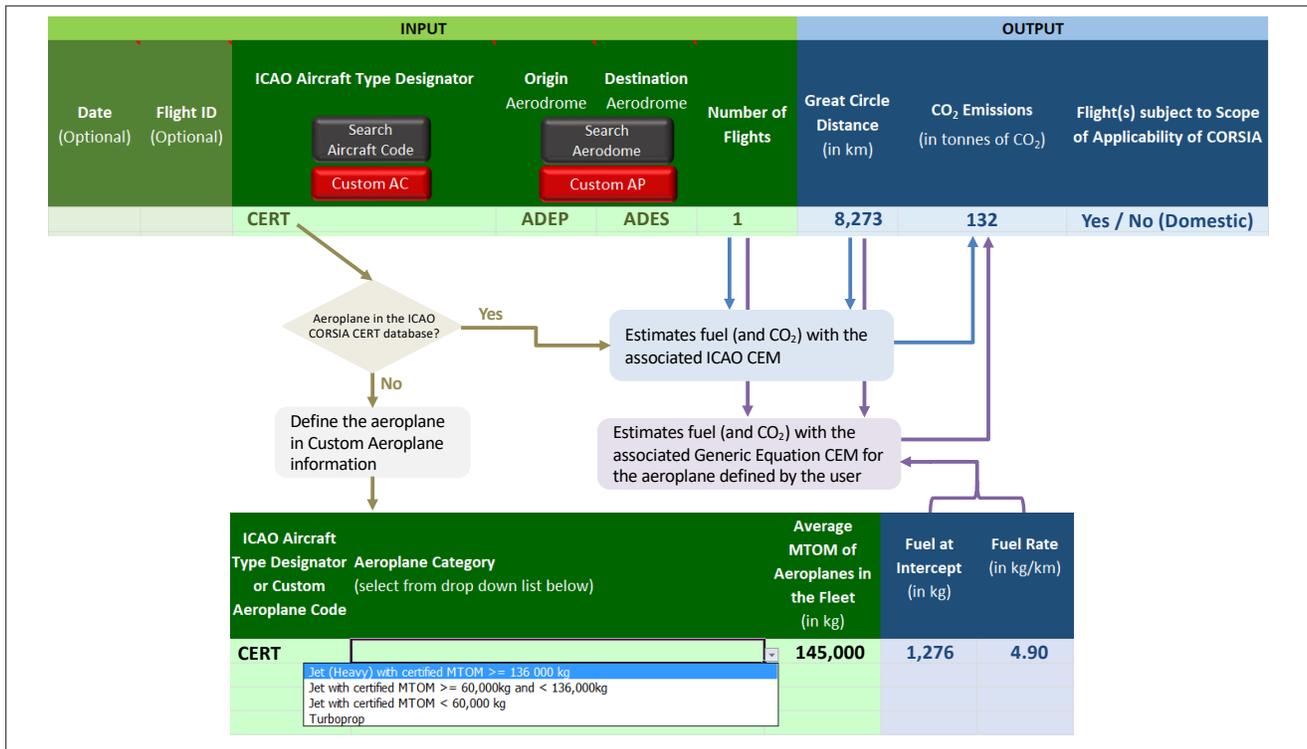


FIGURE 3: Estimation of the CO<sub>2</sub> Emissions with the ICAO CORSIA CERT – Step 2



The second step of the process for estimating the CO<sub>2</sub> emissions, as illustrated by the Figure 3, follows the same logic as the first, except that this step will focus on the type of aeroplane used. The tool will check if the aeroplane is in the ICAO CORSIA CERT database, in other words, if ICAO CEMs exist for this type of aeroplane. If they do, then the system will estimate the fuel burn and CO<sub>2</sub> emissions with the associated ICAO CEM by taking into consideration the number of flights and the GCD/BT. In the scenario where a type of aeroplane is not available, the tool will ask for additional information such as the aeroplane category from a selection of four options (turboprop or three jets with different certified Maximum Take Off Mass – MTOM) and the average MTOM of the aeroplane in the fleet. Based on this information, the ICAO CORSIA CERT will automatically compute a fuel rate and a fuel burn at the intercept. As previously, the tool will estimate fuel burn and CO<sub>2</sub> emissions with the associated Generic Equation CEM and by taking into consideration the number of flights and the GCD/BT.

## CONCLUSION

The methodology behind the ICAO CORSIA CERT, as described above, seems to be complicated but from a user point of view, the use of the ICAO CORSIA CERT is very simple.

The main reason for using the ICAO CORSIA CERT is the simplification of the CO<sub>2</sub> estimation tasks for all users such as States, verification bodies and of course aeroplane operators. It is an easy-to-use ICAO-approved tool with a user-friendly interface, available free of charge and which comes with a detailed and transparent technical manual entitled “*ICAO CORSIA CO<sub>2</sub> Estimation and Reporting Tool (CERT): Design, Development and Validation*”.

Furthermore, the ICAO CORSIA CERT was developed by, and will continually be updated by talented people and with the immeasurable support of Data Providing Organizations (DPOs). Without the support from those aeroplane operators and States in providing fuel burn data, the ICAO CORSIA CERT would not be as reliable as it is today!