ICAO

CORSIA - CERT

Version 2019

Tutorial

This tutorial is valid for the 2019 Version of the ICAO CORSIA CERT only

Table of content

1 Introduction

The ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) is one of the five ICAO CORSIA Implementation Elements and is reflected in the ICAO document entitled "ICAO CORSIA CO_2 Estimation and Reporting Tool", referenced in Annex 16, Volume IV.

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

The ICAO CORSIA CERT also supports aeroplane operators in fulfilling their monitoring and reporting requirements by populating the standardized Emissions Monitoring Plan and Emissions Report templates.

The ICAO CORSIA CERT can mainly be used for two purposes:

i. Assessment of (1) whether the operator is within the applicability scope of the Annex 16, Volume IV, Part II, Chapter 2 requirements towards the submission of the Emissions Monitoring Plan and (2) the operator's eligibility to use the ICAO CORSIA CERT as a monitoring method in 2020; and
ii. Estimation of 2019 CO_2 Emissions and/or Generation of an Emissions Report.

This tutorial has been developed for the 2019 version of the ICAO CORSIA CERT and technical details on the development of the ICAO CORSIA CERT can be found in the *Document ICAO CORSIA CO_2 Estimation & Reporting Tool (CERT): Design, Development, and Validation of the ICAO CORSIA CERT* for 2019 available on the ICAO CORSIA CERT webpage.

2 Navigating through the ICAO CORSIA CERT

On the top of each section of the ICAO CORSIA CERT, a header similar to the one shown in Figure 1 includes the following information/options:

- Title of the current section (e.g. "Step 2. CO_2 emissions estimation"); and
- Button(s) to navigate through the tool back and forth and the "Home" button for moving back to the main page of the tool.

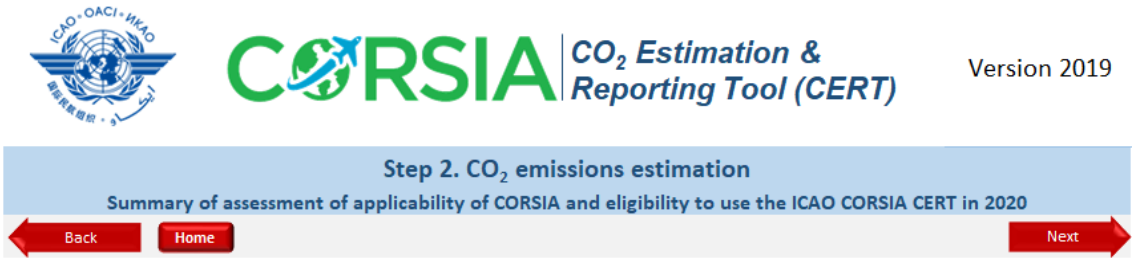


Figure 1: Navigation bar

3 The ICAO CORSIA CERT step-by-step

As mentioned previously, the ICAO CORSIA CERT can be used mainly for two purposes and because those purposes are different, it will require users to go through different steps and provide different information.

Depending on the selection made from the "Background" worksheet, the steps will differ. The following figure summarizes the steps based on the selection made by users from the Background worksheet (for more information, see section 3.1.2). Each little rectangle represents a specific worksheet in the Excel workbook. The text and the color of each worksheet are identical than the little rectangles depicted in Figure 2.

In order to facilitate the navigation through the tutorial, it was divided into three sections and each section has a color (i.e. purple, green and blue). At the bottom of each page, a colored sticker is displayed indicating the current section.

Rectangles in the green section represent the common steps or common functionalities, rectangles in the purple section are steps referred to the first point above (*see Introduction, section i.*) and rectangles in the blue section to the second point (*see Introduction, section ii.*).

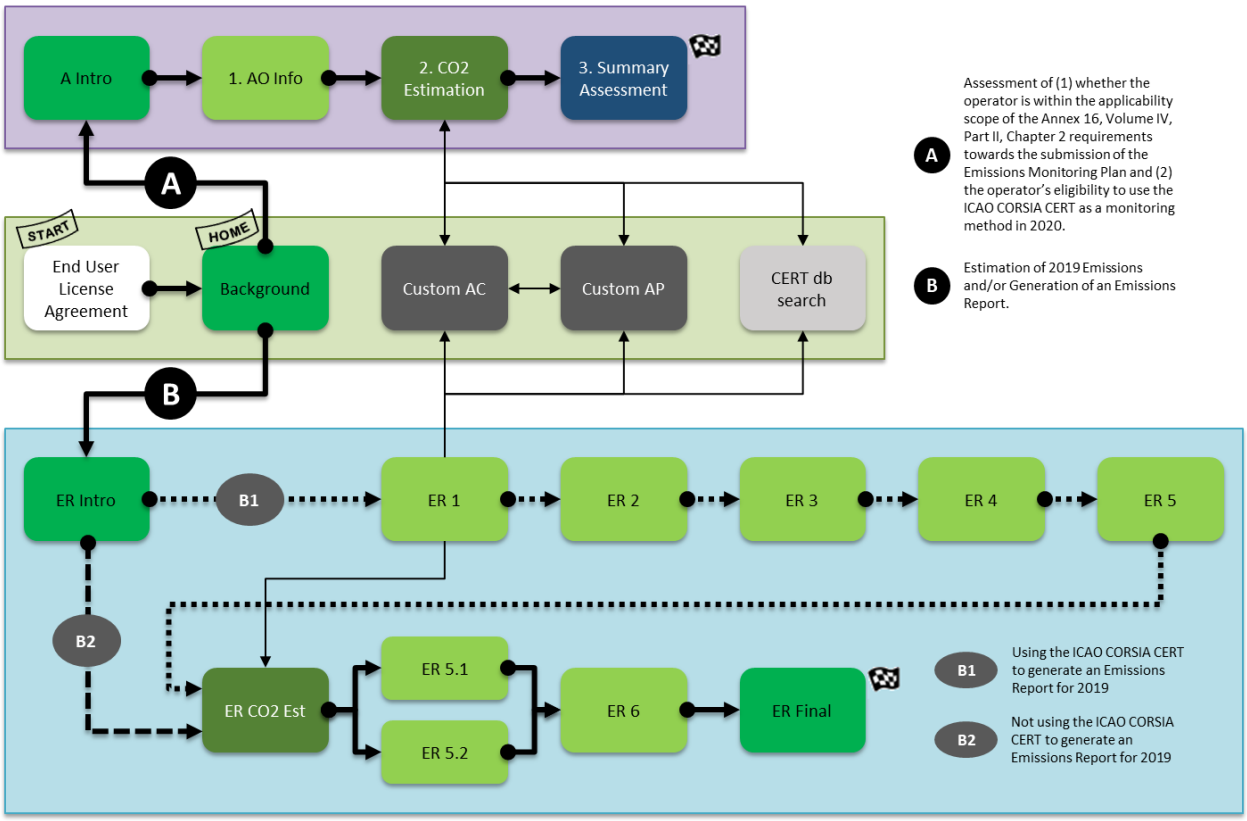


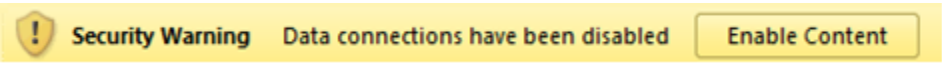
Figure 2: Steps in the ICAO CORSIA CERT

3.1 Common steps

The text in square bracket ([…]) after each title represents the name of the worksheet as appears in the ICAO CORSIA CERT. Each section (i.e. each worksheet) starts with a new page.

3.1.1 End user license agreement [End User License Agreement]

When you start the ICAO CORSIA CERT for the first time, you have to enable the macros by clicking the "Enable Content" button from the yellow banner displayed at the top of the page:



Before starting to use the ICAO CORSIA CERT, please read carefully the terms and conditions of the tool and accept them (see Figure 3).

Figure 3: End user license agreement

Note: *If you do not accept the terms and conditions, you cannot proceed with using the ICAO CORSIA CERT.*

3.1.2 Background [Background]

After accepting the end user license agreement, the "Background" worksheet will be automatically displayed on your screen. This worksheet is divided into three sections (see Figure 4):

i. The purpose of the use of the ICAO CORSIA CERT (grey area with two options and checkboxes)
ii. Background information on the ICAO CORSIA CERT, which helps to answer questions such as what is the ICAO CORSIA CERT, who can use it, for which purpose and how to use it.
iii. List of all the references used for the ICAO CORSIA CERT.

This worksheet (also referred to as "Home") allows users to select the purpose of the use of the ICAO CORSIA CERT. In other words, the selection will orient users either on path A or on path B as illustrated in Figure 2.

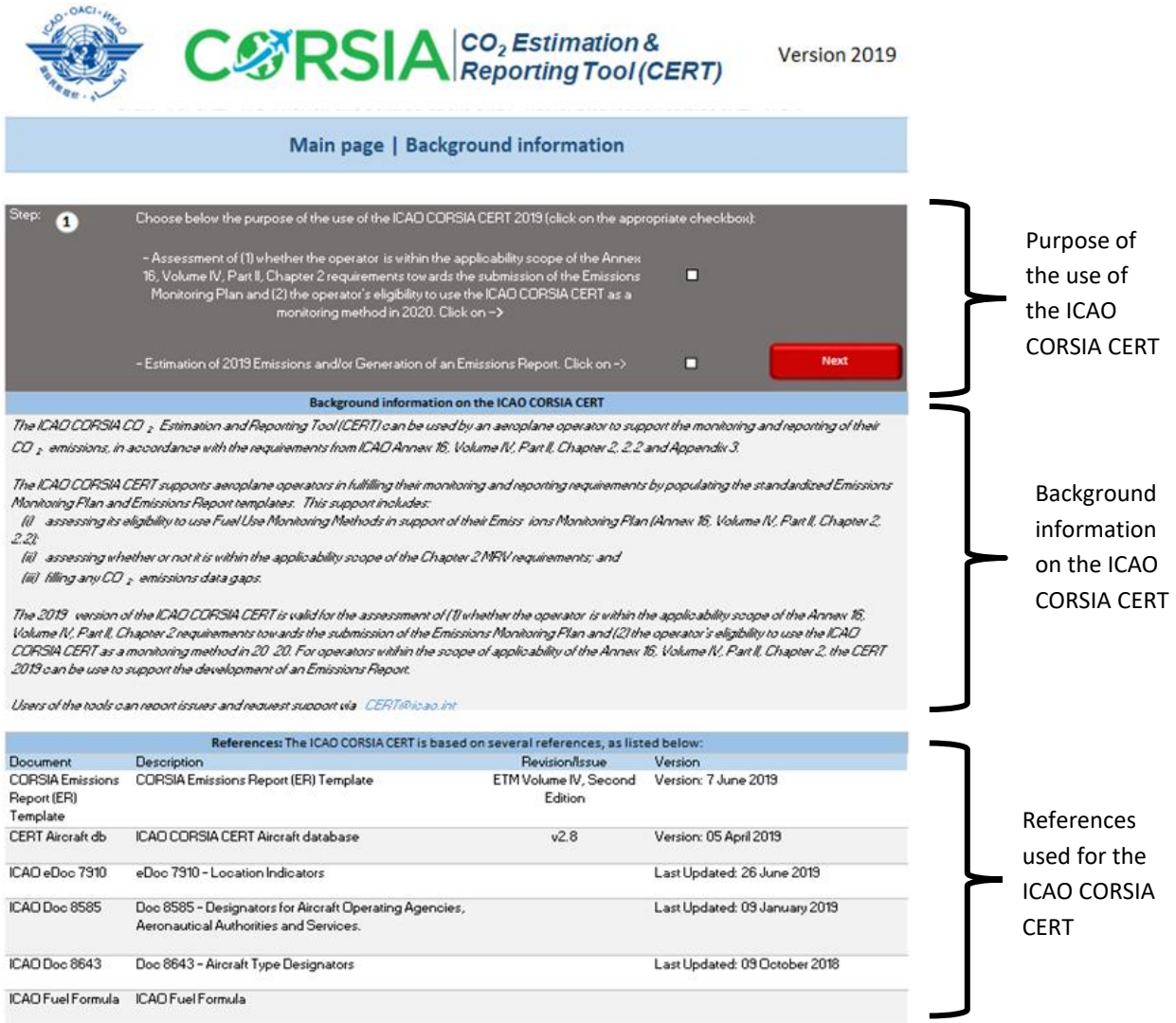


Figure 4: Background information

3.1.3 Custom Aeroplane/Aerodrome [Custom_AC / Custom_AP]

As described in Figure 2, the custom functionalities[1] can be accessed either from the "2. CO2 emissions estimation" worksheet or from the "ER_CO2_Est" worksheet by clicking one of the two buttons as illustrated below:

The ICAO CORSIA CERT uses ICAO Doc 7910 – *Location Indicators* and ICAO Doc 8643 – *Aircraft Type Designators* as the main references for aerodrome codes and aeroplane codes, respectively. However, some aerodromes or aeroplane types may not be included in the ICAO CORSIA CERT for several reasons. For example:

- An aerodrome could be missing because the relevant State authority has not provided the required information to ICAO.
- An aeroplane type could be missing because it may be a new aeroplane type or a not commonly used aeroplane type.

You can add both missing aerodromes and custom aeroplanes by providing information using the "Custom aerodrome information" section (see Figure 5) and the "Custom aeroplane information" section (see Figure 6).

Custom aerodrome [Custom_AP]

To enter a new aerodrome in the ICAO CORSIA CERT, the following information is required (Figure 5: ❶):

i. Custom aerodrome code
ii. Aerodrome name
iii. Latitude
iv. Longitude
v. ICAO Member State

Based on the information above, the tool will compute the Great Circle Distance using the coordinates.

You can customize the symbols for coordinates by clicking the "Customize Lat./Long. Separation Symbols" button (Figure 5: ❷). Users can also check if coordinates entered are correct by clicking the "Check Validity of Lat./Long. Format" button (Figure 5: ❸). If an error occurs, an error code will be displayed (information on error codes can be found in the ICAO CORSIA CERT FAQs).

Note: *Information on aerodromes that has been preloaded in the ICAO CORSIA CERT database can be modified. For example, if the coordinates and/or the associated ICAO State name are incorrect, you can manually enter the aerodrome code in the custom aerodrome section and provide the correct*

[1] The access to the custom functionalities requires users to select one of the two purposes of the ICAO CORSIA CERT from the "Background" worksheet.

information. The ICAO CORSIA CERT gives priority to aerodrome codes listed in the custom aerodrome section and not those available in the ICAO CORSIA CERT database.

Note: *You cannot modify/overwrite the name of an ICAO State.*

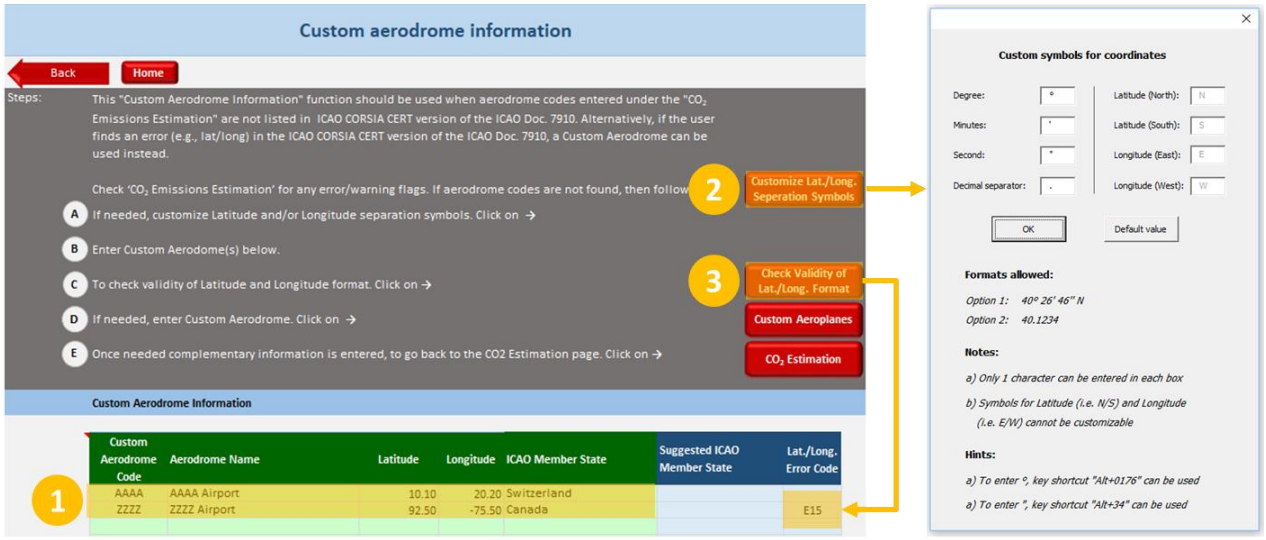


Figure 5: Custom aerodrome information

Custom aeroplane [Custom_AC]

To enter a new ICAO Aircraft Type Designator or Custom aeroplane code in the ICAO CORSIA CERT, the following information is required:

i. ICAO Aircraft Type Designator or Custom aeroplane code
ii. Aeroplane category (4 options available from a dropdown menu)
iii. Average Maximum Take Off Mass[2] (MTOM) of aeroplanes in the fleet (in kg)

Based on the information above, the tool will compute the generic equations for Great Circle Distance input and Block Time input (see Figure 6).

Note: *You cannot modify/overwrite the information of the aeroplane types that are preloaded in the ICAO CORSIA CERT database.*

[2] *The average MTOM is calculated using the arithmetical average of individual MTOMs of aeroplane in the fleet of a given aeroplane type code, divided by the number of aeroplane in the fleet of the given aeroplane type code. The individual MTOMs are the individual 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.*

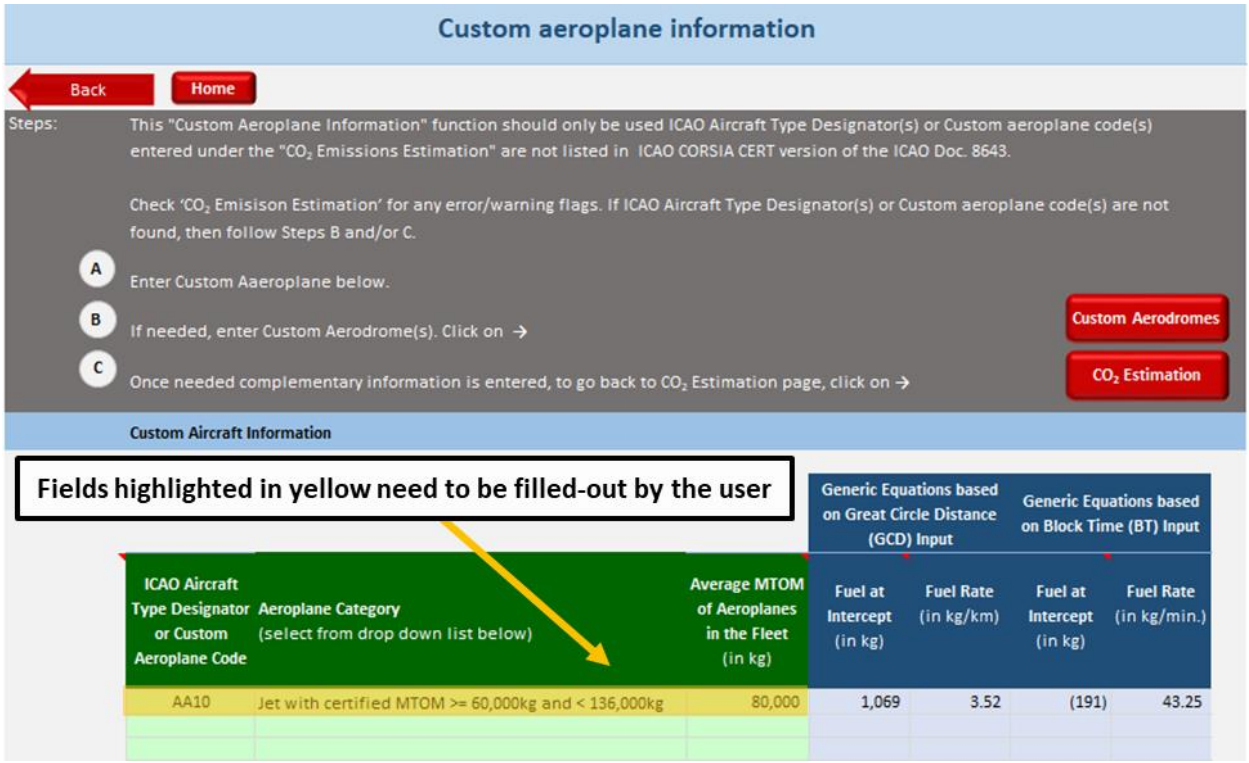


Figure 6: Custom aeroplane information

3.1.4 Search Aeroplane/Aerodrome [CERT_db_search]

The ICAO CORSIA CERT includes a search engine for aeroplane types and aerodromes. This functionality[3] can be accessed either from the "2. CO2 emissions estimation" worksheet or from the "ER_CO2_Est" worksheet by clicking one of the two buttons as illustrated below:

From the interface illustrated in Figure 7, you can search:

- An aeroplane type either by ICAO Aircraft Type Designator or by aeroplane model
- An aerodrome (either by ICAO aerodrome code or aerodrome name).

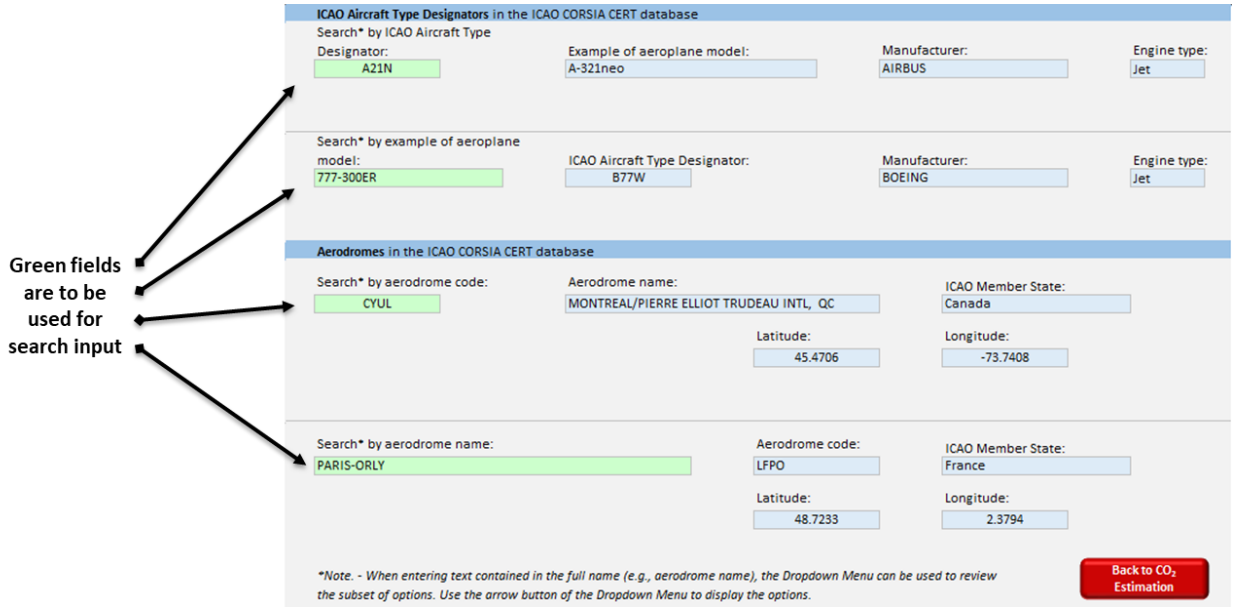


Figure 7: Searchable ICAO CORSIA CERT databases of aeroplane types and aerodromes

[3] The access to the custom functionalities requires users to select one of the two purposes of the ICAO CORSIA CERT from the "Background" worksheet.

3.2 ICAO CORSIA CERT used for the Summary Assessment

The text in square bracket ([…]) after each title represents the name of the worksheet as appears in the ICAO CORSIA CERT. Each section (i.e. each worksheet) starts with a new page.

3.2.1. Introduction [A_Intro]

This worksheet highlights the three steps for the generation of the summary assessment and provides the buttons for accessing each step.

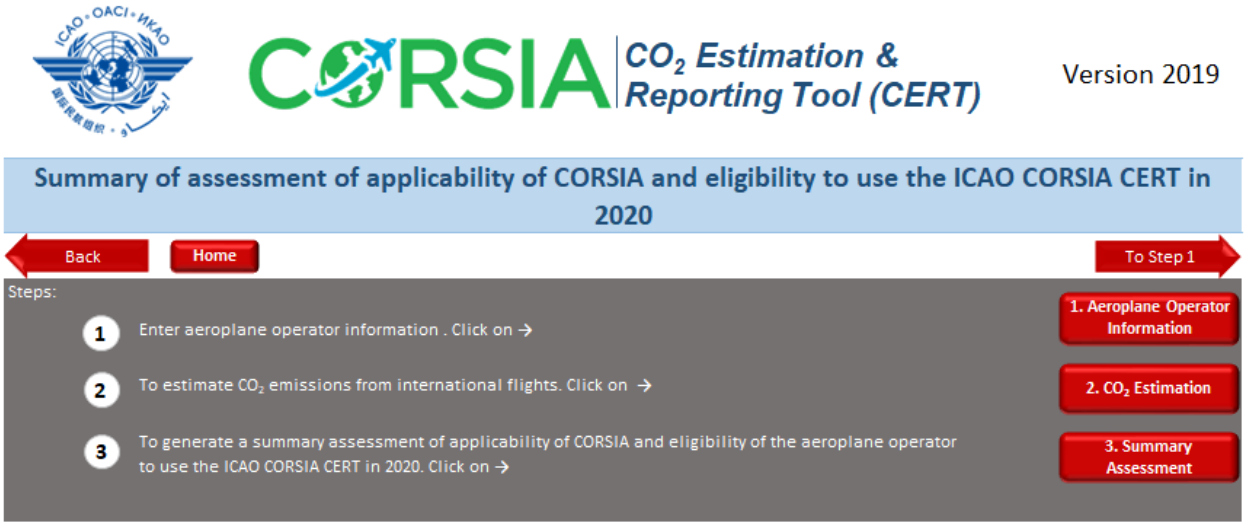


Figure 8: Introduction

3.2.2 Aeroplane operator identification [1. AO Info]

In accordance with Annex 16, Volume IV, Part II, Chapter 2, 2.2.2, an aeroplane operator shall submit an Emissions Monitoring Plan (EMP) to the State to which it is attributed for approval by the State.

It is recommended that an aeroplane operator use the standardized EMP template to develop the EMP for submission to its State. To facilitate the use of the template, a light version of the EMP template (i.e. only the aeroplane operation identification section) is embedded into the ICAO CORSIA CERT. The complete EMP template can be downloaded from the CORSIA webpage.

Green fields in the form are the inputs that the user needs to fill-in (see Figure 9). Some of these fields are populated using drop-down menus.

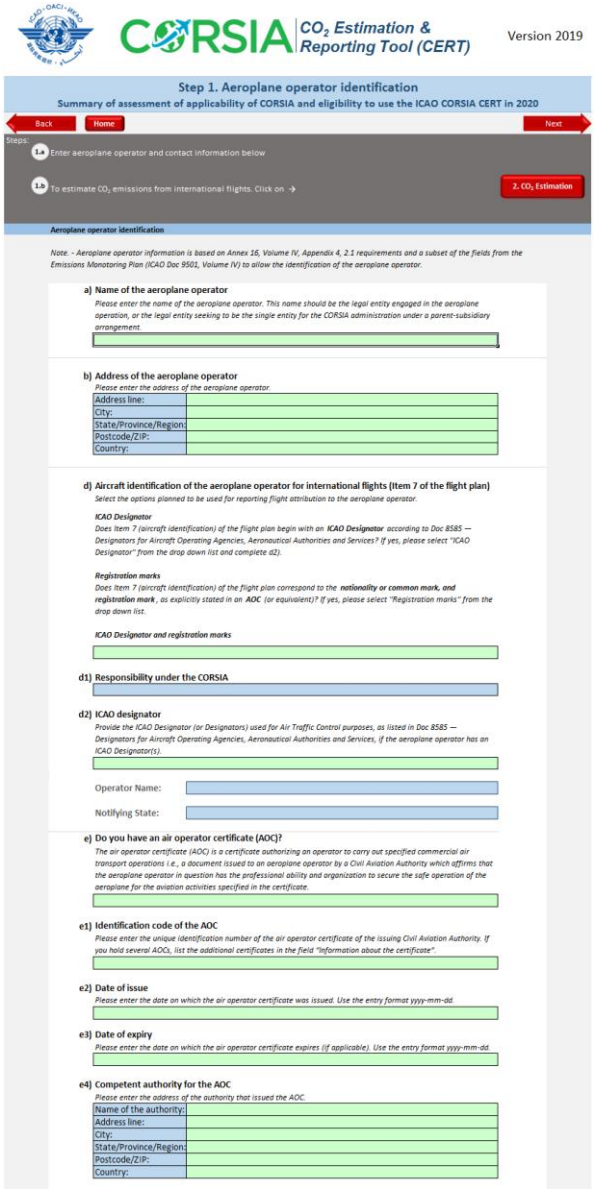


Figure 9: Aeroplane operator identification page

3.2.3 CO_2 emissions estimation [2. CO2 Estimation]

The CO_2 emissions estimation page will estimate CO_2 emissions based on provided traffic data. Multiple options are offered for importing data:

- **Option 1:** Fill-in the form manually by selecting the ICAO aircraft type designator, aerodrome of origin and aerodrome of destination from the drop-down menus (see figure 10).

Figure 10: Process for filling-out the form manually

- **Option 2:** Copy/paste data from external sources

- **Option 3:** Import a CSV (Comma Separated Values) file containing traffic data which respects the following format (see figure 11 on how to import a CSV file and figure 12 for the CSV structure):
  i. Date (optional) – leave cell blank if no dates are provided
  ii. Flight ID (optional) – leave cell blank if no flight ID is provided
  iii. ICAO aircraft type designator (mandatory)
  iv. Origin aerodrome (mandatory)
  v. Destination aerodrome (mandatory)
  vi. Number of flights – if the field is left blank then the tool will automatically set it with "1"

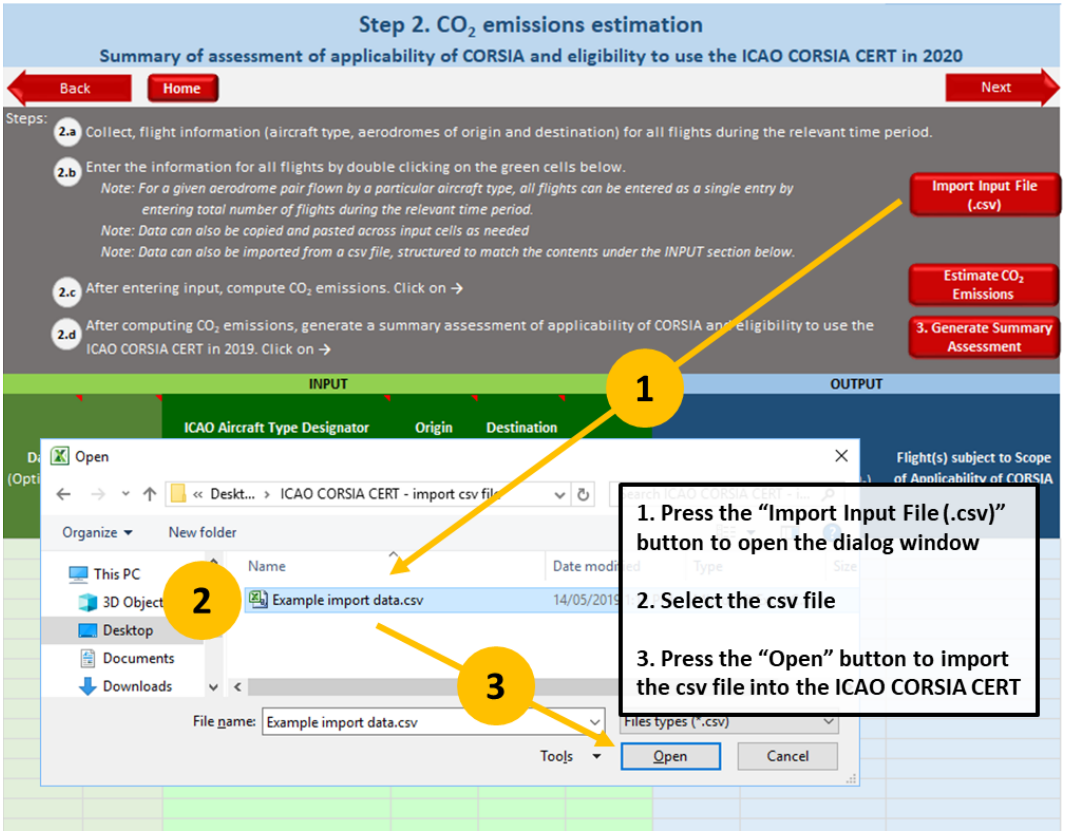
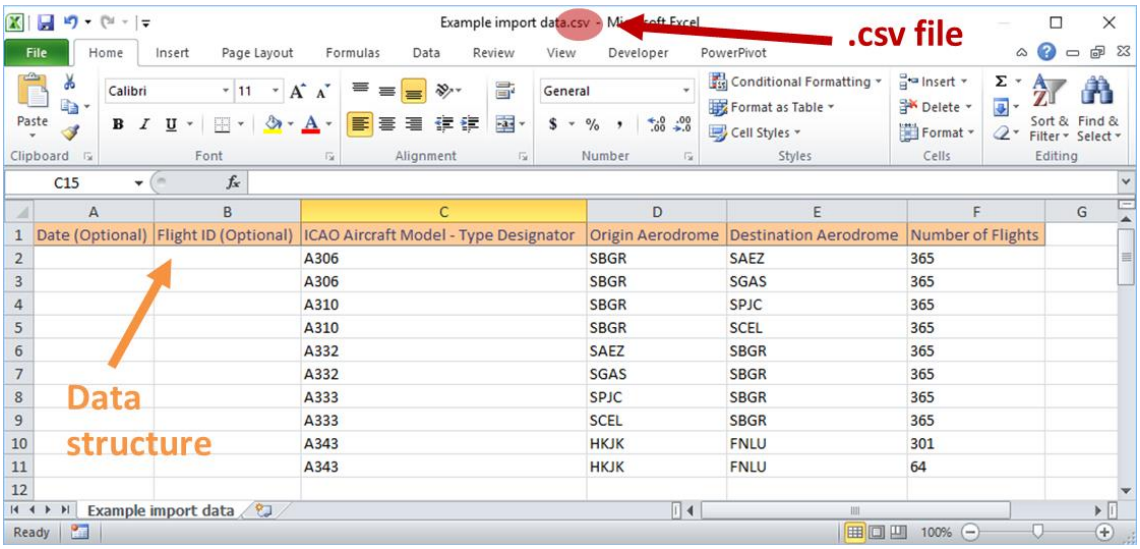


Figure 11: Import Input File (.csv)



	A	B	C	D	E	F	G
1	Date (Optional)	Flight ID (Optional)	ICAO Aircraft Model - Type Designator	Origin Aerodrome	Destination Aerodrome	Number of Flights	
2			A306	SBGR	SAEZ	365	
3			A306	SBGR	SGAS	365	
4			A310	SBGR	SPJC	365	
5			A310	SBGR	SCEL	365	
6			A332	SAEZ	SBGR	365	
7			A332	SGAS	SBGR	365	
8			A333	SPJC	SBGR	365	
9			A333	SCEL	SBGR	365	
10			A343	HKJK	FNLU	301	
11			A343	HKJK	FNLU	64	
12							

Figure 12: Sample of a CSV file

Once data has been imported/entered, press the "Estimate CO_2 Emissions" button to calculate the Great Circle Distance between each aerodrome pair and to estimate the CO_2 emissions. Furthermore, the tool

highlights if the flights are subject to the scope of applicability of CORSIA (i.e. if the flight is operated on an international route or not[4]). See Figure 13 for an illustrative example.

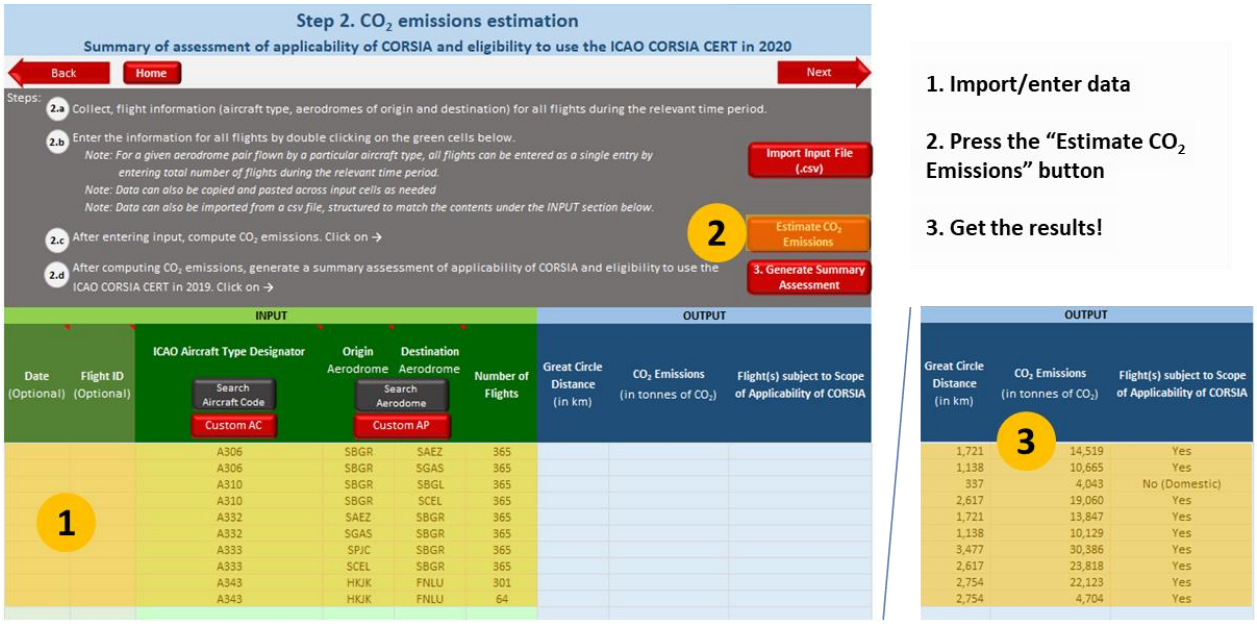


Figure 13: Process of estimating CO_2 emissions

[4] From 2021 onward, the ICAO CORSIA CERT will identify if the flight is under the scope of applicability of CORSIA and if the flight is subject to offsetting requirement.

3.2.4 Summary of assessment of applicability of CORSIA and eligibility to use the ICAO CORSIA CERT in 2020 [3. Summary Assessment]

After clicking the "3. Generate Summary Assessment" button from Step 2, a draft summary assessment will be generated for your review (see Figure 14 for more information on the structure of the summary assessment).

After reviewing the summary assessment, you can generate a copy of it as a PDF file by clicking the "Generate Copy of Summary Assessment" button.

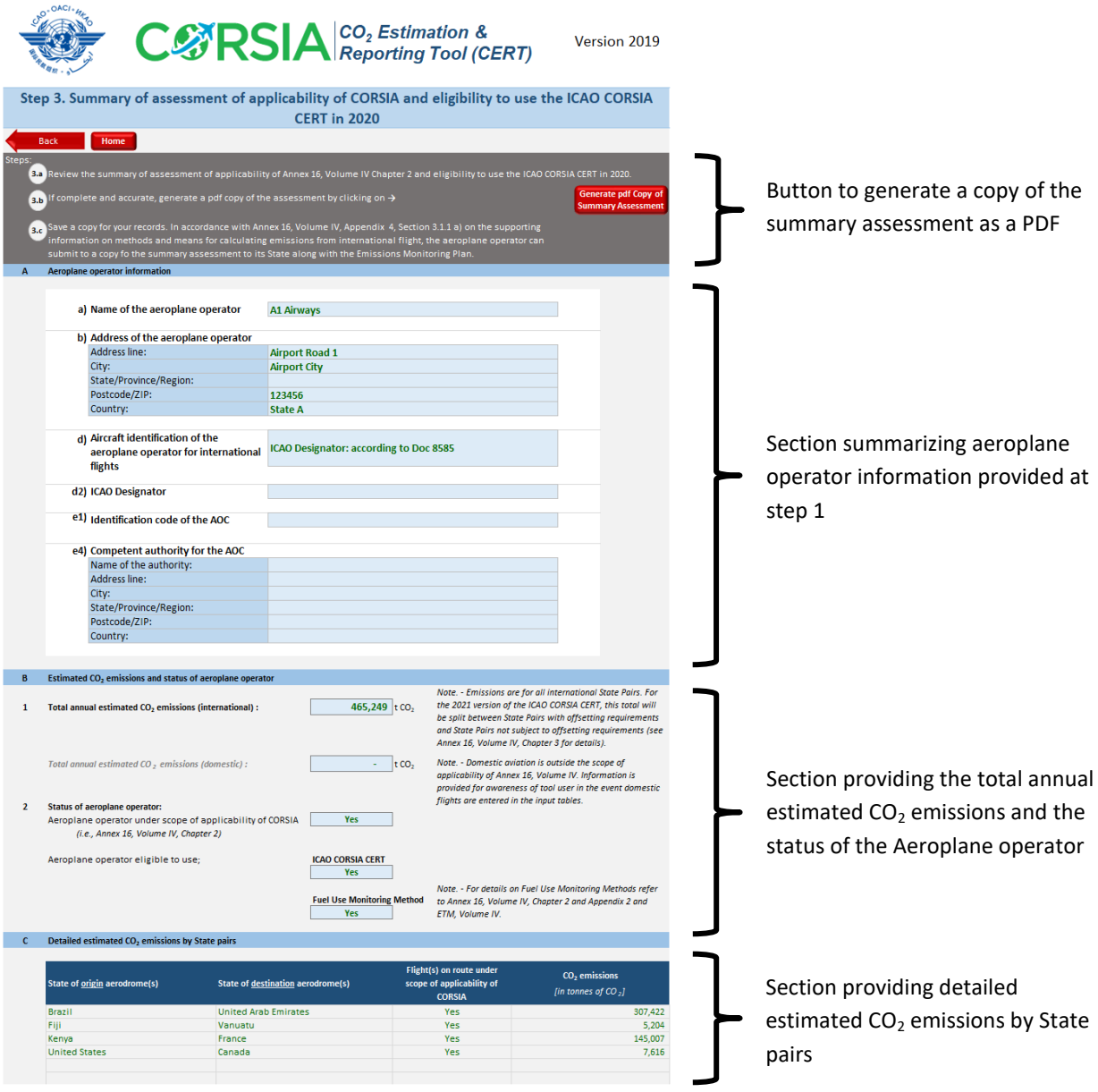


Figure 14: Summary of assessment of applicability of CORSIA and eligibility to use the ICAO CORSIA CERT in 2020

3.3 ICAO CORSIA CERT used for Emissions Estimation with Emissions Report

The text in square bracket ([…]) after each title represents the name of the worksheet as appears in the ICAO CORSIA CERT. Each section (i.e. each worksheet) starts with a new page.

3.3.1 Introduction [ER_Intro]

In this worksheet, you need to answer questions and select the appropriate input. Based on the selection, inputs will be different (differences are explained in section 3.3.7).

The ICAO CORSIA CERT can be used as a primary monitoring method if the aeroplane operator is eligible and the operator chooses to do so. CO_2 emissions can be estimated based on either Great Circle Distance or Block Time. Users make this choice by selecting one of two checkboxes highlighted in yellow in Figure 15.

The ICAO CORSIA CERT can also be used for filling data gaps if the aeroplane operator uses one of the five Fuel Use Monitoring Methods. CO_2 emissions can be estimated either based on Great Circle Distance or Block Time by selecting one of two checkboxes highlighted in blue in Figure 15.

Checkboxes highlighted in yellow and blue are mutually exclusive meaning that only one checkbox can be selected at the time. But the checkbox highlighted in orange is independent and optional. If the checkbox highlighted in orange is checked then a complete Emissions Report will be generated at the end of the process.

For the example in section 3.3, it is assumed that the orange checkbox is checked. Section titles marked with an asterisk (*) refer to sections to be filled by users if the generation of the Emissions Report functionality is activated.

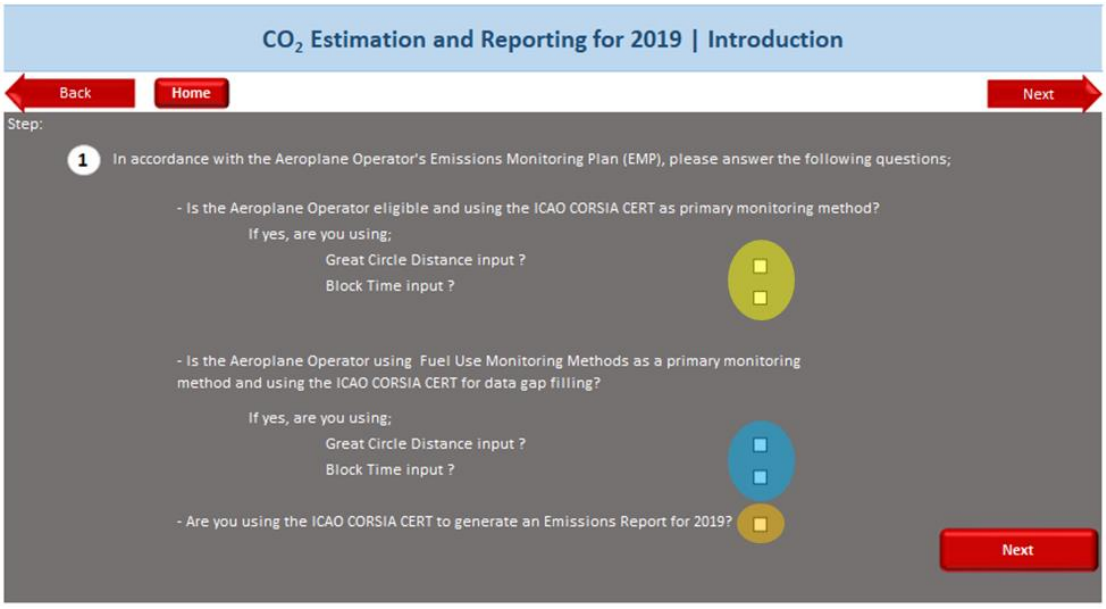


Figure 15: Introduction

3.3.2 Aeroplane operator identification and description of activities [ER 1]

This section is dedicated to the aeroplane operator identification and description of activities.

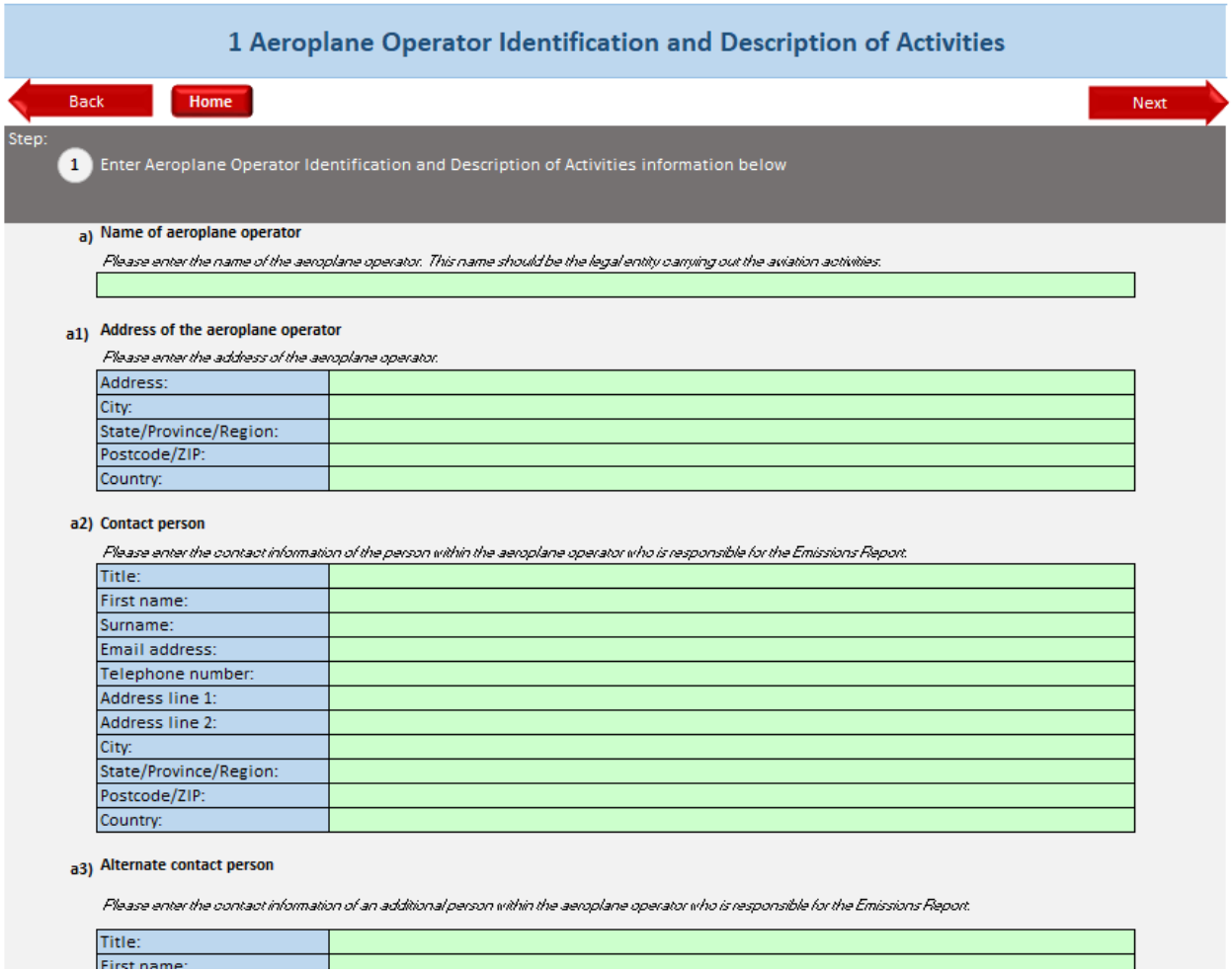


Figure 16: Aeroplane operator identification and description of activities

3.3.3 Underlying basic information of the Emissions Report [ER 2]

This section is dedicated to the underlying basic information of the Emissions Report.

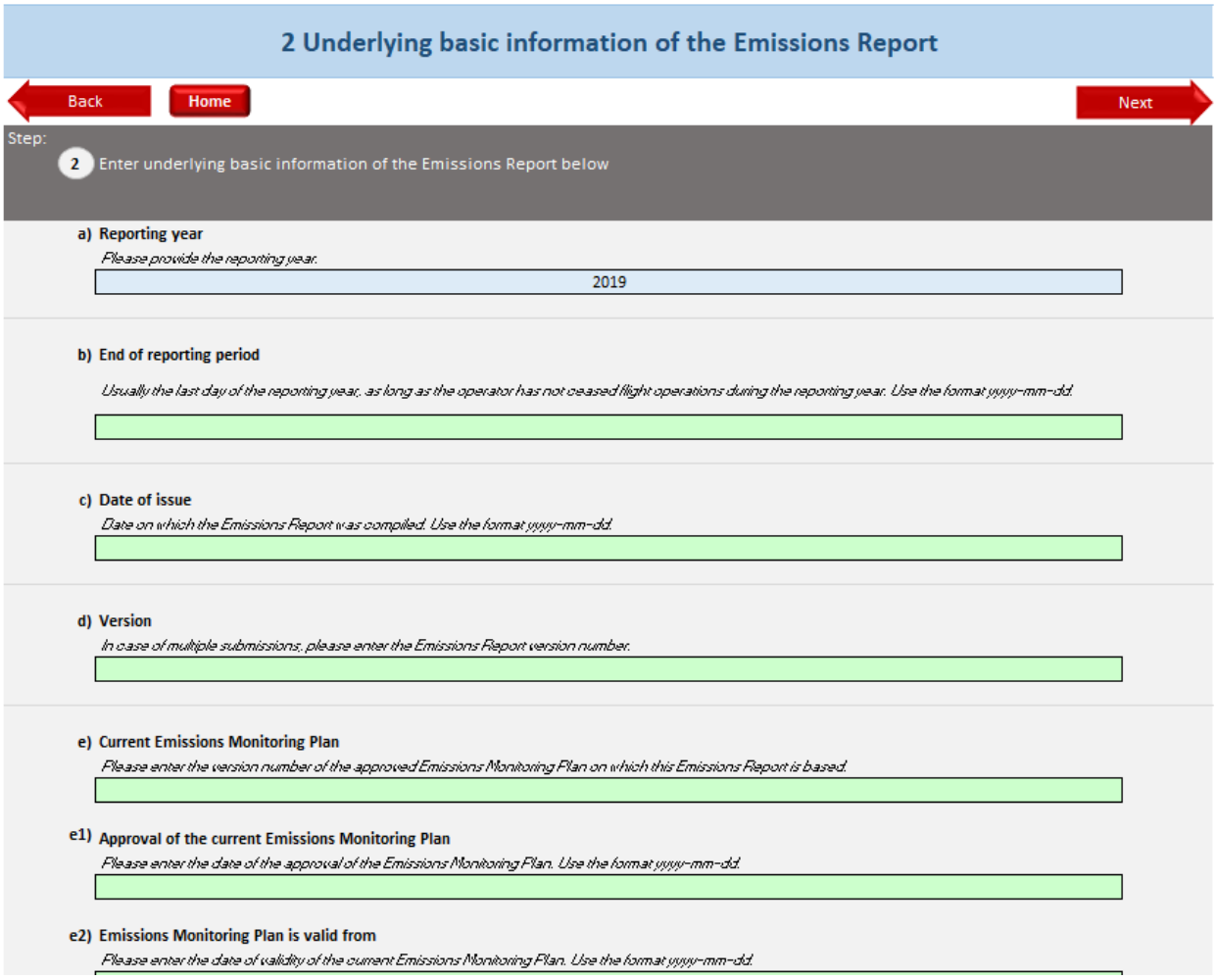
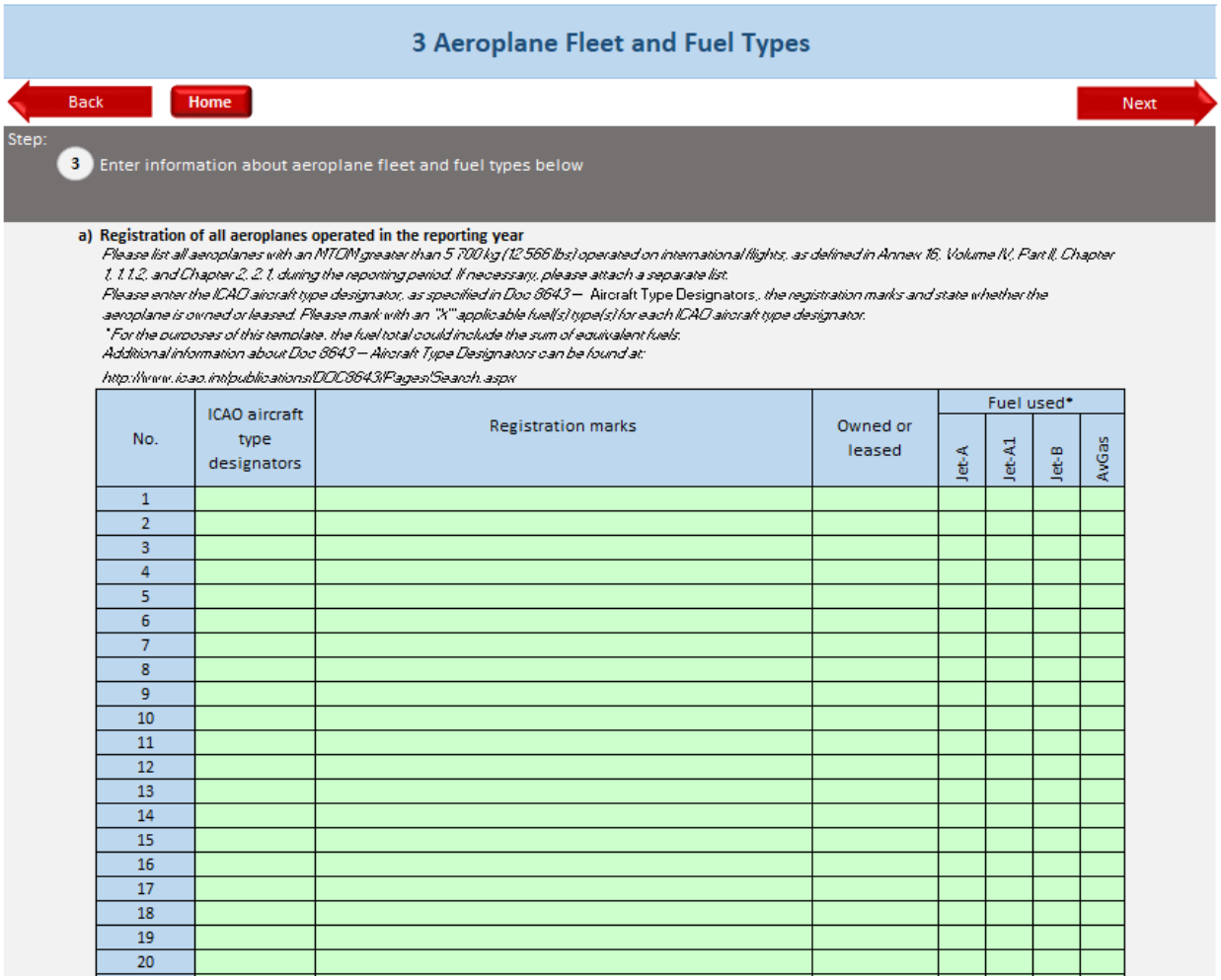


Figure 17: Underlying basic information of the Emissions Report

3.3.4 Aeroplane fleet and fuel types [ER 3]

This section is dedicated to the aeroplane fleet and fuel types.



3 Aeroplane Fleet and Fuel Types

Back Home Next

Step: 3 Enter information about aeroplane fleet and fuel types below

a) Registration of all aeroplanes operated in the reporting year

Please list all aeroplanes with an MTOW greater than 5 700 kg (12 566 lbs) operated on international flights, as defined in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 2, 2.1, during the reporting period. If necessary, please attach a separate list.

Please enter the ICAO aircraft type designator, as specified in Doc 8643 – Aircraft Type Designators*., the registration marks and state whether the aeroplane is owned or leased. Please mark with an "X" applicable fuel(s) type(s) for each ICAO aircraft type designator.*

**For the purposes of this template, the fuel total could include the sum of equivalent fuels.*

Additional information about Doc 8643 – Aircraft Type Designators can be found at:

http://www.icao.int/publications/DOC8643/Pages/Search.aspx

No.	ICAO aircraft type designators	Registration marks	Owned or leased	Fuel used*			
				Jet-A	Jet-A1	Jet-B	AvGas
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
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20							

Figure 18: Aeroplane Fleet and Fuel Types

3.3.5 Fuel density [ER 4]

This section is dedicated to the fuel density.

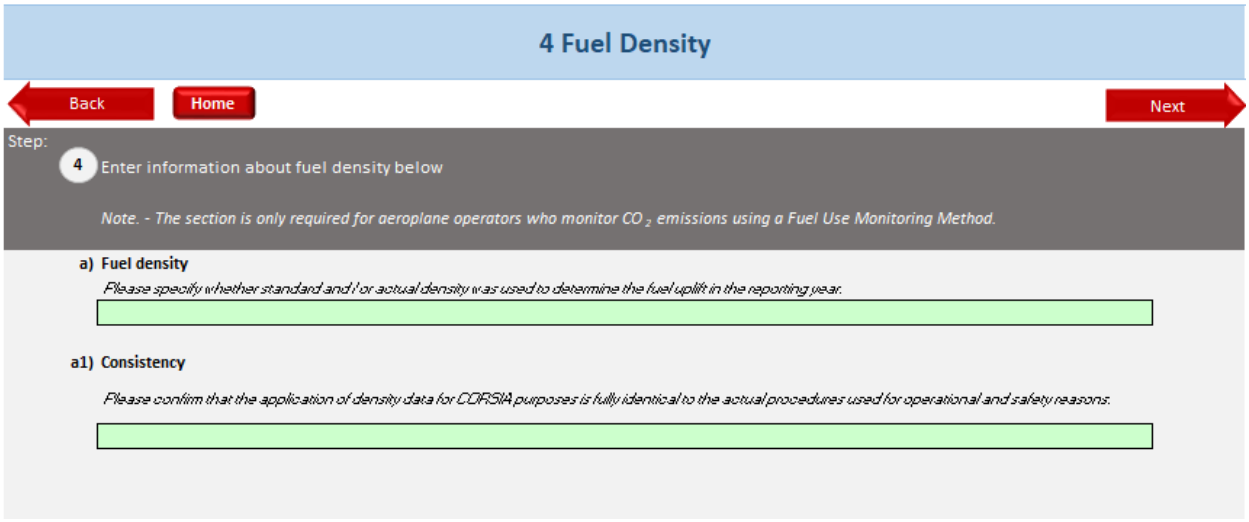


Figure 19: Fuel Density

3.3.6 Reporting [ER 5]

This section is dedicated to reporting. You can aggregate the reported data on two levels:

- State pair level or
- Aerodrome pair level.

Based on the selection made in this section, the tool will automatically redirect to the relevant worksheet (i.e. either ER 5.1 or ER 5.2) after the estimation of the CO_2 emissions.

If the Emissions Report functionality is not selected, you still have the possibility to generate a partially filled-in Emissions Report that will contain various statistics available in worksheets ER 5.1 or ER 5.2 and ER 6. To do this, you can click the "Populate ER with CO_2 Information" button from worksheet ER_CO2_Est and specify the level of aggregation in worksheet ER 5.

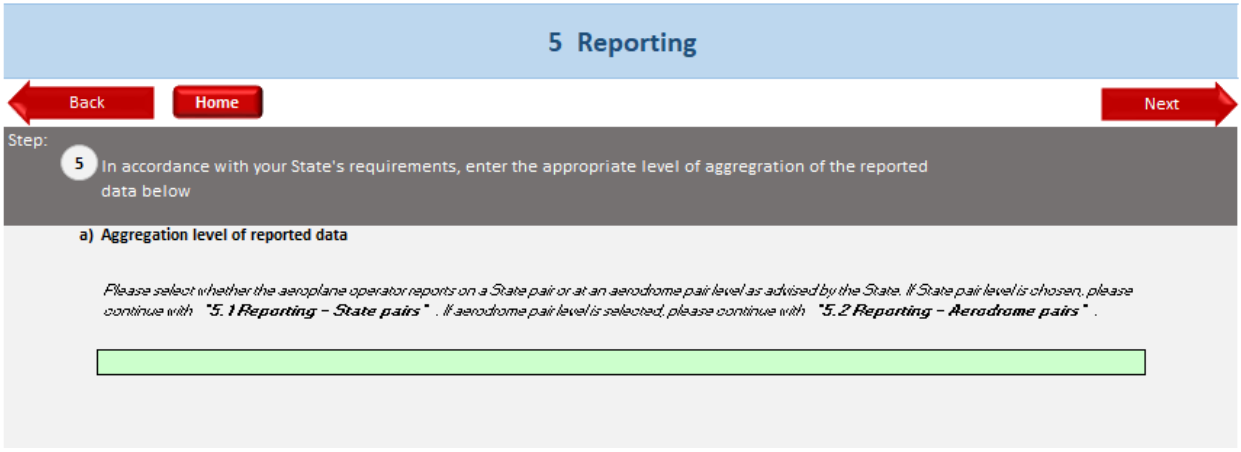


Figure 20: Reporting

3.3.7 CO_2 Emissions estimation and Data gap filling [ER_CO2_Est]

In this worksheet, you will have to import data using any of the three options explained in section 3.2.3.

Based on the selection made in worksheet ER_Intro, the data input requirement will be different. The interface as such will remain the same, but some fields will be automatically greyed-out. The following figures summarize how the interface will look depending on the selection made in worksheet ER_Intro.

You are able to import a CSV (Comma Separated Values) file containing traffic data if it is in the following format. If any field is not relevant/optional, you can leave the field blank.

i. Date
ii. Flight ID
iii. ICAO aircraft type designator
iv. Origin aerodrome
v. Destination aerodrome
vi. Number of flights
vii. Total Block Time for all flights (in min.)
viii. Total Fuel Use for all Flights (in tonnes)
ix. Type of Fuel
x. Data Gap Reference

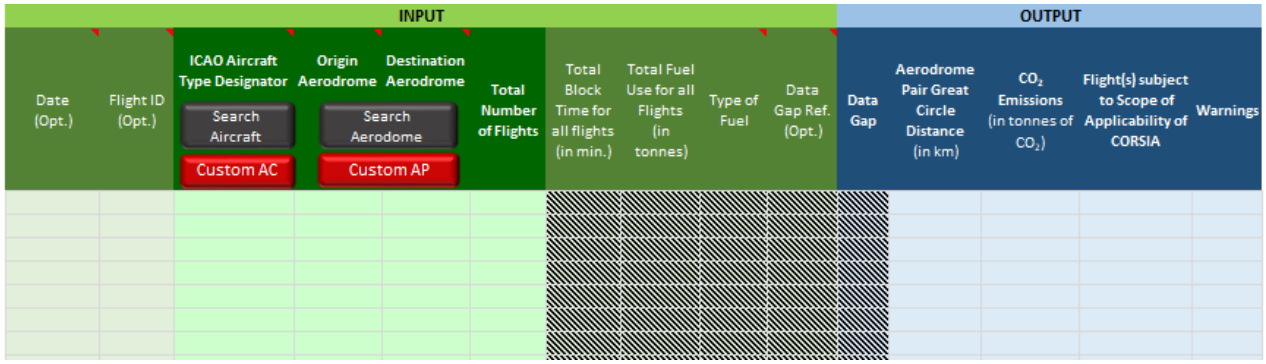


Figure 21: Use as primary monitoring method and based on Great Circle Distance

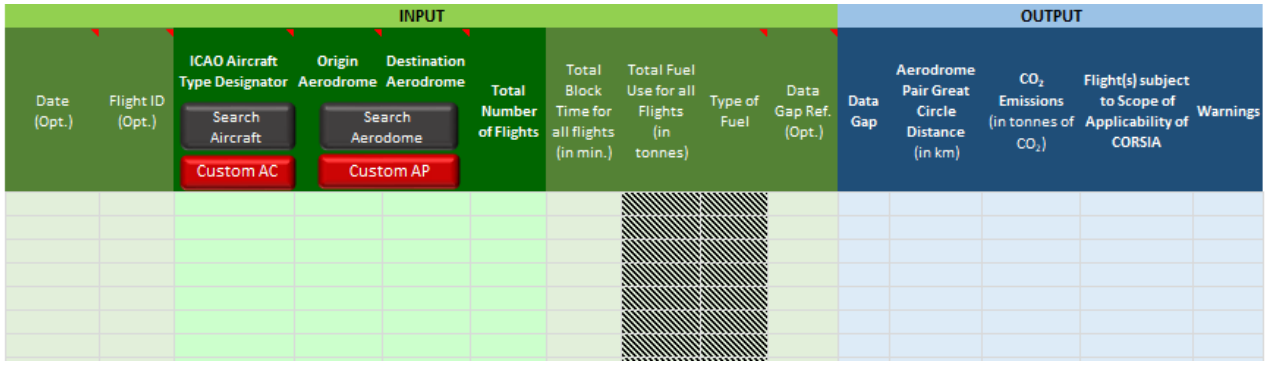


Figure 22: Use as primary monitoring method and based on Block Time

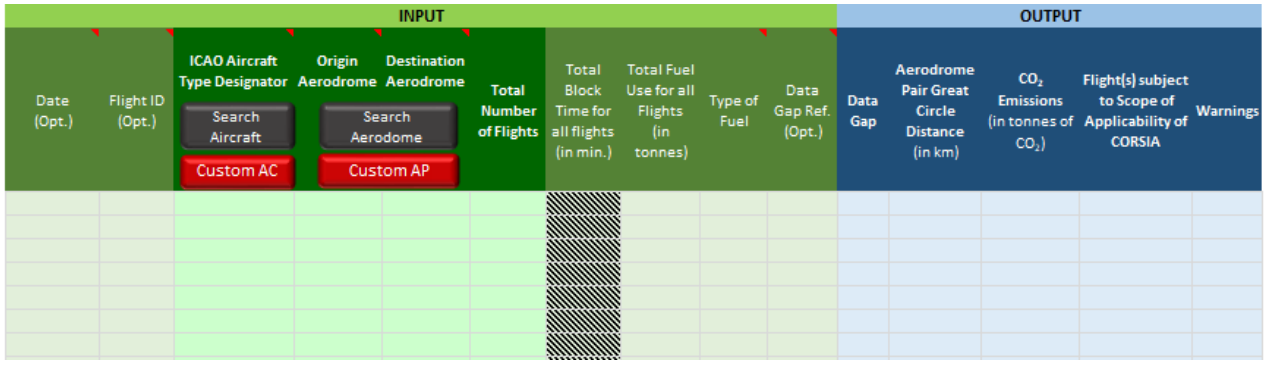


Figure 23: Combined use of Fuel Use Monitoring Method and data gap filling based on Great Circle Distance

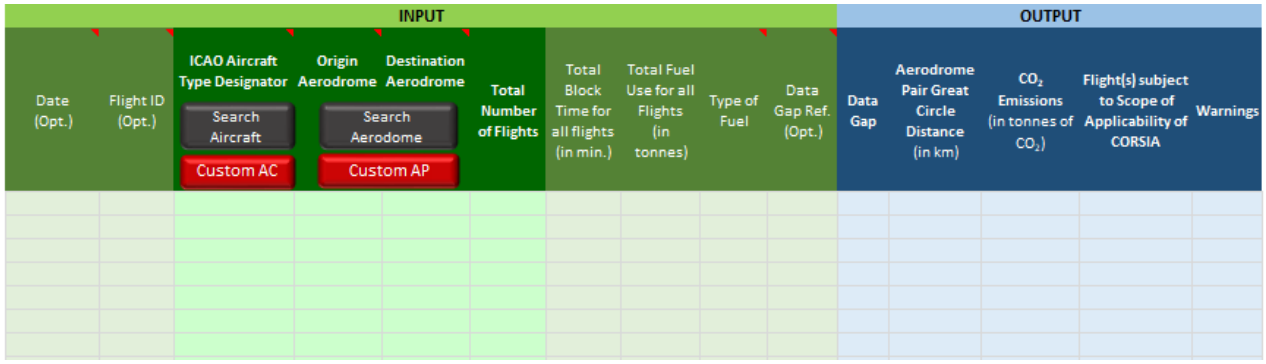


Figure 24: Combined use of Fuel Use Monitoring Method and data gap filling based on Block Time

Once data has been imported/entered, press the "Estimate CO_2 Emissions" button. Depending of the use the ICAO CORSIA CERT and the type input (i.e. Great Circle Distance or Block Time), different output will be returned.

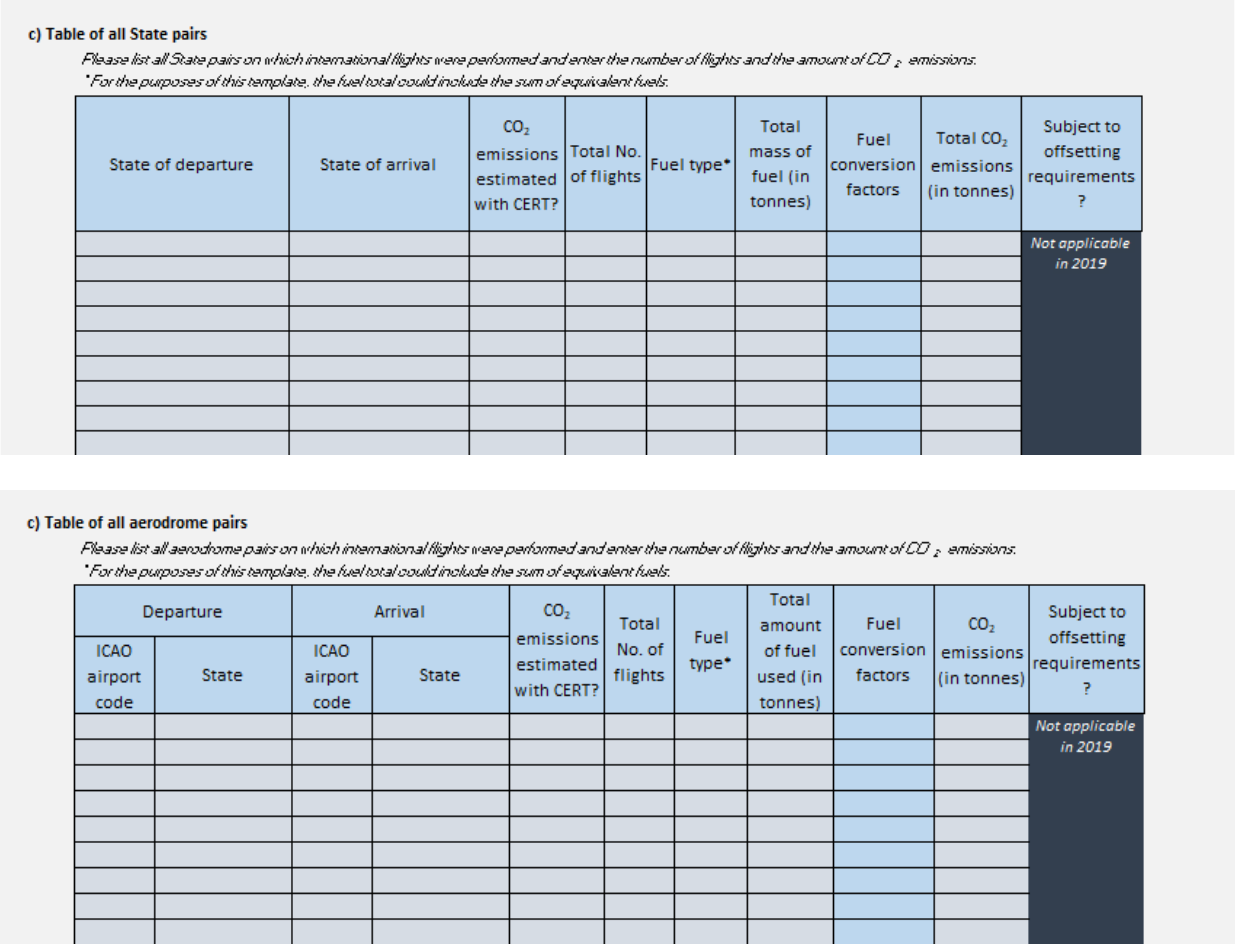
The following table summarizes all types of output and the expected format:

Output	Format	Comment
Data Gap	• "Yes" • Blank field	Data gap occurs if: **For CO_2 emissions estimation – based on Block Time:** 1. "*Total Block Time for all flights*" information is missing **For Data gap filling:** 2. "*Total Fuel Use for all Flights*" information is missing 3. "*Type of Fuel*" information is missing
Aerodrome Pair Great Circle Distance (in km)	• Distance (in km) • Blank field	Great Circle Distance (GCD) is computed only when CO_2 emissions are estimated based on GCD.
CO_2 Emissions (in tonnes of CO_2)	• CO_2 emissions (in tonnes) • Blank field	CO_2 emissions are estimated if the ICAO CORSIA CERT is used for CO_2 emissions estimation or for filling data gaps. If "*Total Fuel Use for all Flights*" and "*Type of Fuel*" fields are filled, the "*CO_2 Emissions*" field is left blank.
Flight(s) subject to Scope of Applicability of CORSIA	• "Yes" • "No (Domestic)"	For flights operated on an international route, a "Yes" is returned otherwise it is a "No (Domestic)".
Warnings	• "Fuel Cap." • "Range" • "Date" • Blank field	The ICAO CORSIA CERT runs non-binding checks when estimating the CO_2 emissions. If estimated fuel burn exceeds the fuel tank capacity or the maximum range capability of an aeroplane type, a "Fuel Cap." or "Range" warning is displayed. If a year other than the current year is entered in the "*Date*" field, the "Date" warning is displayed.

Table 1: List of outputs

3.3.8 Reporting - State pairs / Reporting - Aerodrome pairs [ER 5.1 / ER 5.2]

Depending on the selection made in worksheet ER 5, section c) will be different (see Figure 25). The rest of the form remains the same. These specific sections are automatically partially pre-filled when the "Populate ER with CO_2 Information" button (located in worksheet ER_CO2_Est) is pressed.



c) Table of all State pairs

Please list all State pairs on which international flights were performed and enter the number of flights and the amount of CO_2 emissions.

**For the purposes of this template, the fuel total could include the sum of equivalent fuels.*

State of departure	State of arrival	CO_2 emissions estimated with CERT?	Total No. of flights	Fuel type*	Total mass of fuel (in tonnes)	Fuel conversion factors	Total CO_2 emissions (in tonnes)	Subject to offsetting requirements ?
								Not applicable in 2019

c) Table of all aerodrome pairs

Please list all aerodrome pairs on which international flights were performed and enter the number of flights and the amount of CO_2 emissions.

**For the purposes of this template, the fuel total could include the sum of equivalent fuels.*

Departure		Arrival		CO_2 emissions estimated with CERT?	Total No. of flights	Fuel type*	Total amount of fuel used (in tonnes)	Fuel conversion factors	CO_2 emissions (in tonnes)	Subject to offsetting requirements ?
ICAO airport code	State	ICAO airport code	State							
										Not applicable in 2019

Figure 25: Reporting – State pairs / Reporting – Aerodrome pairs

3.3.9 Data gaps [ER 6]

This section is dedicated to data gaps. It is automatically partially pre-filled when the "Populate ER with CO_2 Information" button (located in worksheet ER_CO2_Est) is pressed.

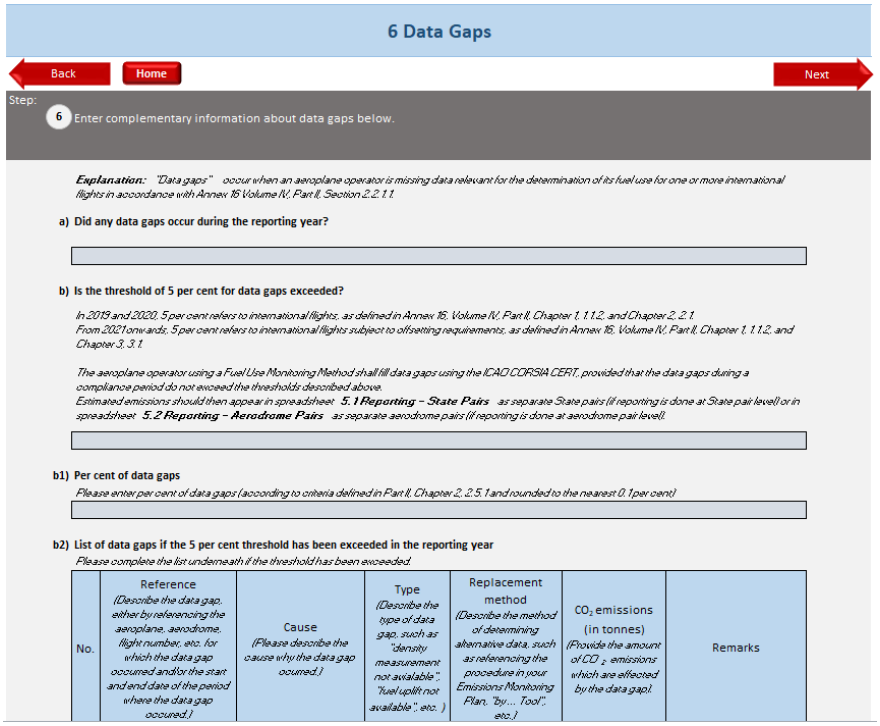


Figure 26: Data gaps

3.3.10 Review and file export [ER_Final]

In this worksheet, you can generate different documents.

The Emissions Report can be generated in Excel format and in PDF format. When generating the Emissions Report, a log document (in PDF format) will be automatically generated. This document contains general information and statistics on the ICAO CORSIA CERT spreadsheet used.

The two last buttons offer the possibility to download the entire table (i.e. input and output) from the worksheet ER_CO2_Est and to download information entered on Custom Aerodrome and Custom Aeroplane.

Figure 27: Review and File Export

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