



ICAO

# INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

RECONNECTING **THE** WORLD



ICAO

ENVIRONMENT



# Emissions Monitoring Plans and Monitoring of CO<sub>2</sub> Emissions

---

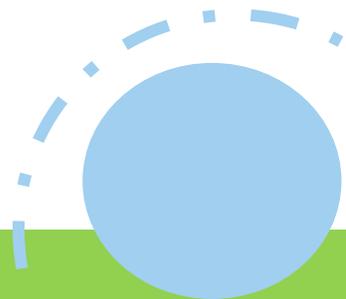
***ICAO-CASSOA-RCAA ENV Workshop***

***Kigali, Rwanda (23-26 May 2023)***

***Ms. Chinga Mazhetese***

***Regional Officer: Environment/ Meteorology***

***ICAO ESAF Office, Nairobi***



- A monitoring, reporting and verification (MRV) system is a key component of CORSIA implementation
  - Implementation of the MRV system from 1 January 2019 for all international flights is essential to establish CORSIA's baseline (2019-2020 average)
  - Purpose of MRV is to collect information on international aviation CO<sub>2</sub> emissions on an annual basis and compare emissions from 2021 against the baseline emissions

## Monitoring

Monitoring of CO<sub>2</sub> emissions is either based on a Fuel Use Monitoring Method, or the use of the ICAO CORSIA CERT.

## Reporting

CO<sub>2</sub> emissions will be reported from aeroplane operators to their State Authority, and from States to ICAO.

## Verification

CO<sub>2</sub> emissions information is accurate and free of errors.

- Monitoring, reporting and verification of aeroplane operator's annual CO<sub>2</sub> emissions – Annex 16, Volume IV, Chapter 2

## 2.1 Applicability of MRV Requirements

## 2.2 Monitoring of CO<sub>2</sub> Emissions

## 2.3 Reporting of CO<sub>2</sub> Emissions

## 2.4 Verification of CO<sub>2</sub> Emissions

## 2.5 Data Gaps

## 2.6 Error Correction to Emissions Reports

### CHAPTER 2. MONITORING, REPORTING AND VERIFICATION (MRV) OF AEROPLANE OPERATOR ANNUAL CO<sub>2</sub> EMISSIONS

#### 2.1 Applicability of MRV requirements

*Note.— See also Chapter 1 for administration requirements of the State and aeroplane operator.*

2.1.1 The Standards and Recommended Practices of this Chapter shall be applicable to an aeroplane operator that produces annual CO<sub>2</sub> 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 1.1.2, on or after 1 January 2019, with the exception of humanitarian, medical and firefighting flights.

2.1.2 **Recommendation.—** *When considering whether a flight is international or domestic, an aeroplane operator and a State should use, for the purpose of this Volume, Doc 7910 — Location Indicators, which contains a list of aerodromes and the State they are attributed to. Further guidance material is also provided in the Environmental Technical Manual (Doc 9501), Volume IV — Procedures for demonstrating compliance with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA).*

2.1.3 The Standards and Recommended Practices of this Chapter shall not be applicable to international flights, as defined in 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.

2.1.4 The Standards and Recommended Practices of this Chapter shall be applicable to a new entrant aeroplane operator from the year after it meets the requirements in 2.1.1 and 2.1.3.

2.1.5 **Recommendation.—** *If the aeroplane operator is close to the threshold of annual CO<sub>2</sub> emissions, as defined in 2.1.1 and 2.1.3, from international flights, as defined in 1.1.2, it should consider engaging with the State to which it is attributed for guidance. Likewise, the State should carry out oversight of the aeroplane operators attributed to it, and engage with any that it considers may be close to or above the threshold. The aeroplane operator with annual CO<sub>2</sub> emissions below the threshold may choose to voluntarily engage with the State to which it is attributed.*

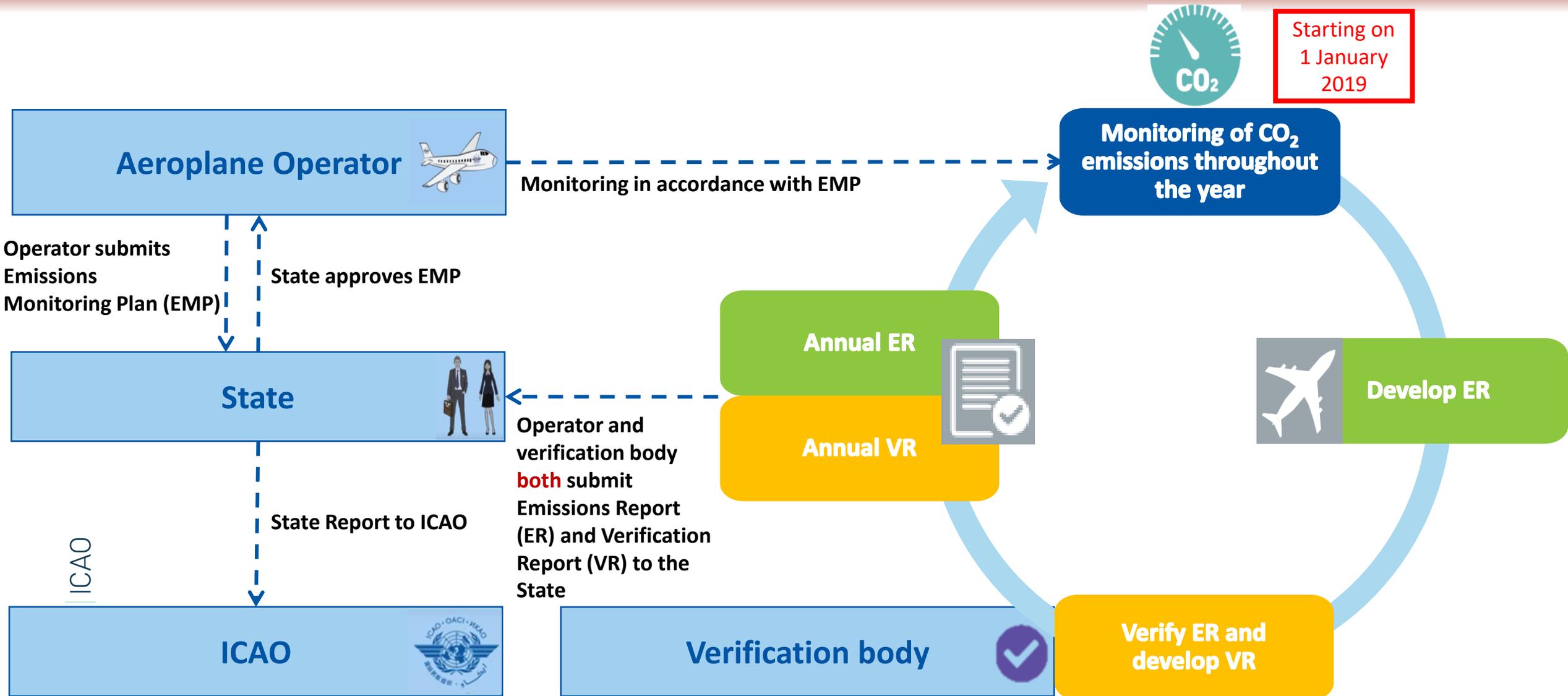
*Note.— See Attachment B Figure B-1 for a process flowchart on the determination of the applicability of Chapter 2 to international flights, as defined in 1.1.2.*

#### 2.2 Monitoring of CO<sub>2</sub> emissions

##### 2.2.1 Eligibility of monitoring methods

2.2.1.1 The aeroplane operator shall monitor and record its fuel use from international flights, as defined in 1.1.2 and 2.1, in accordance with an eligible monitoring method as defined in 2.2.1.2 and 2.2.1.3, and approved by the State to which it is attributed. Following approval of the Emissions Monitoring Plan, the aeroplane operator shall use the same eligible monitoring method for the entire compliance period.

# Annual Cycle for MRV Activities



# Applicability of CO<sub>2</sub> Monitoring Requirements under CORSIA

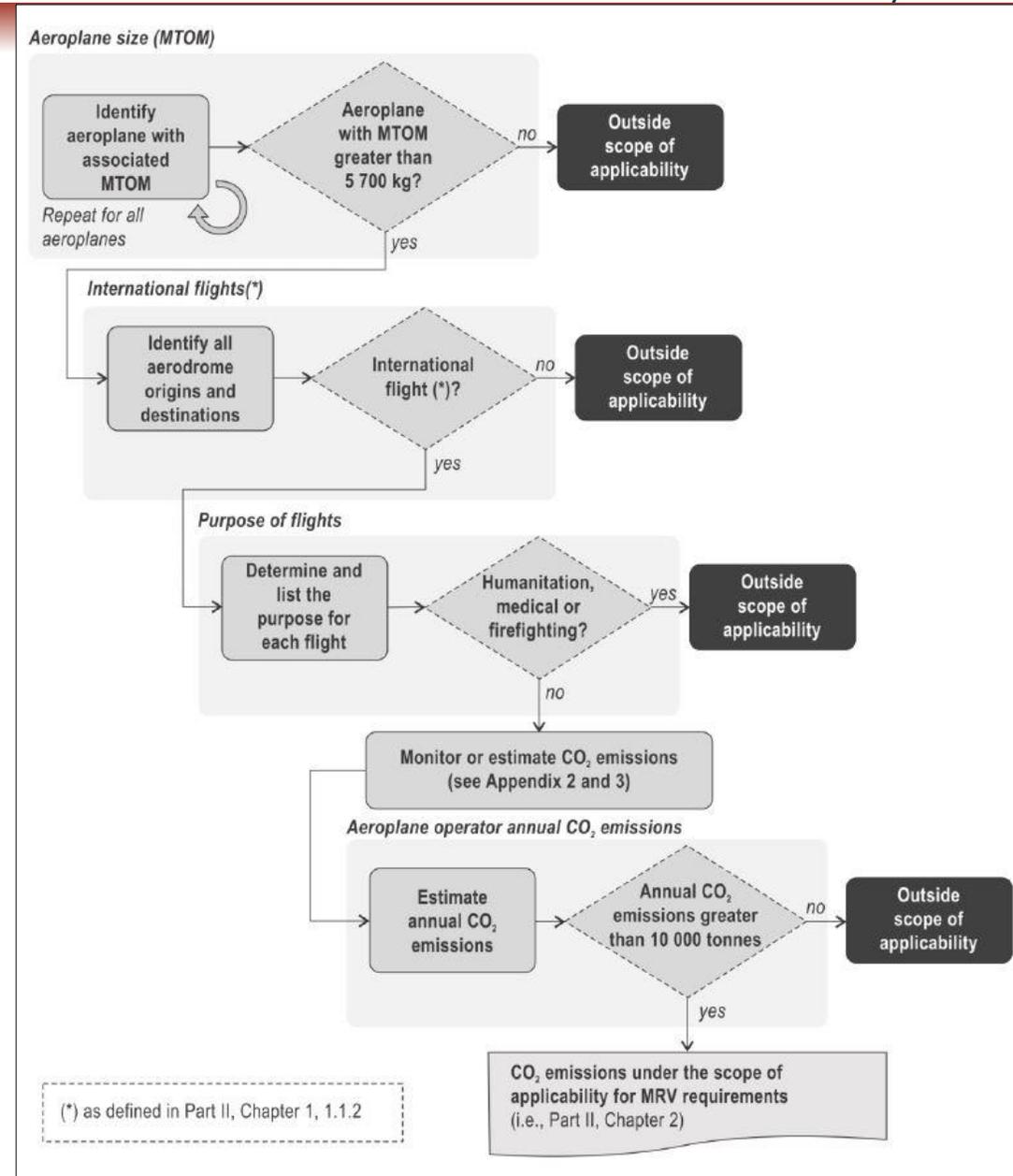
# Applicability of Monitoring Requirements

- Aviation activity is covered by CORSIA monitoring requirements, if the activity is:

- From the use of an aeroplane with a maximum certificated take-off mass of greater than 5,700 kg
- From international operations on or after 1 January 2019
- With the exception of humanitarian, medical and firefighting operations



- From an operator that produces annual CO<sub>2</sub> emissions greater than 10,000 tonnes



# Applicability of Monitoring Requirements: Illustrative Example of the 10,000 tonnes of CO<sub>2</sub> Threshold

- One-way flight of approximately 2 hours
- Round trip operated once every day: 365 days a year, a total of 730 flights
- Using a medium-sized aeroplane (in this example, E190)

**Annual CO<sub>2</sub> emissions  
10,000+ tonnes**

From	To	Annual CO <sub>2</sub> emissions, tonnes*
Singapore (WSSS)	Bangkok (VTBS)	10,176
Luanda (FNLU)	Windhoek (FYWH)	11,206
Montreal (CYUL)	Atlanta (KATL)	11,383
Rome (LIRF)	London (EGLL)	10,388
Mexico City (MMMX)	Havana (MUHA)	12,561
Buenos Aires (SABE)	Sao Paulo (SBGR)	12,021
Abu Dhabi (OMAA)	Baghdad (ORBI)	10,176

\* Estimated with ICAO CORSIA CERT

# Applicability of Monitoring Requirements: Some Specific Cases

Can an aeroplane operator with emissions of less than 10 000 tonnes of CO<sub>2</sub> per year be included in CORSIA?

- An operator that produces annual CO<sub>2</sub> emissions from international flights less than or equal to 10 000 tonnes is not subject to CORSIA requirements
- However, if the operator is wholly-owned by and legally registered in the same State as another aeroplane operator, the two aeroplane operators can request to be treated as a single operator, and in this case, the combined emissions of both operators could exceed the threshold

What are the actions for an aeroplane operator, who has been covered by CORSIA, but now drops below the 10 000 tonnes of CO<sub>2</sub> threshold?

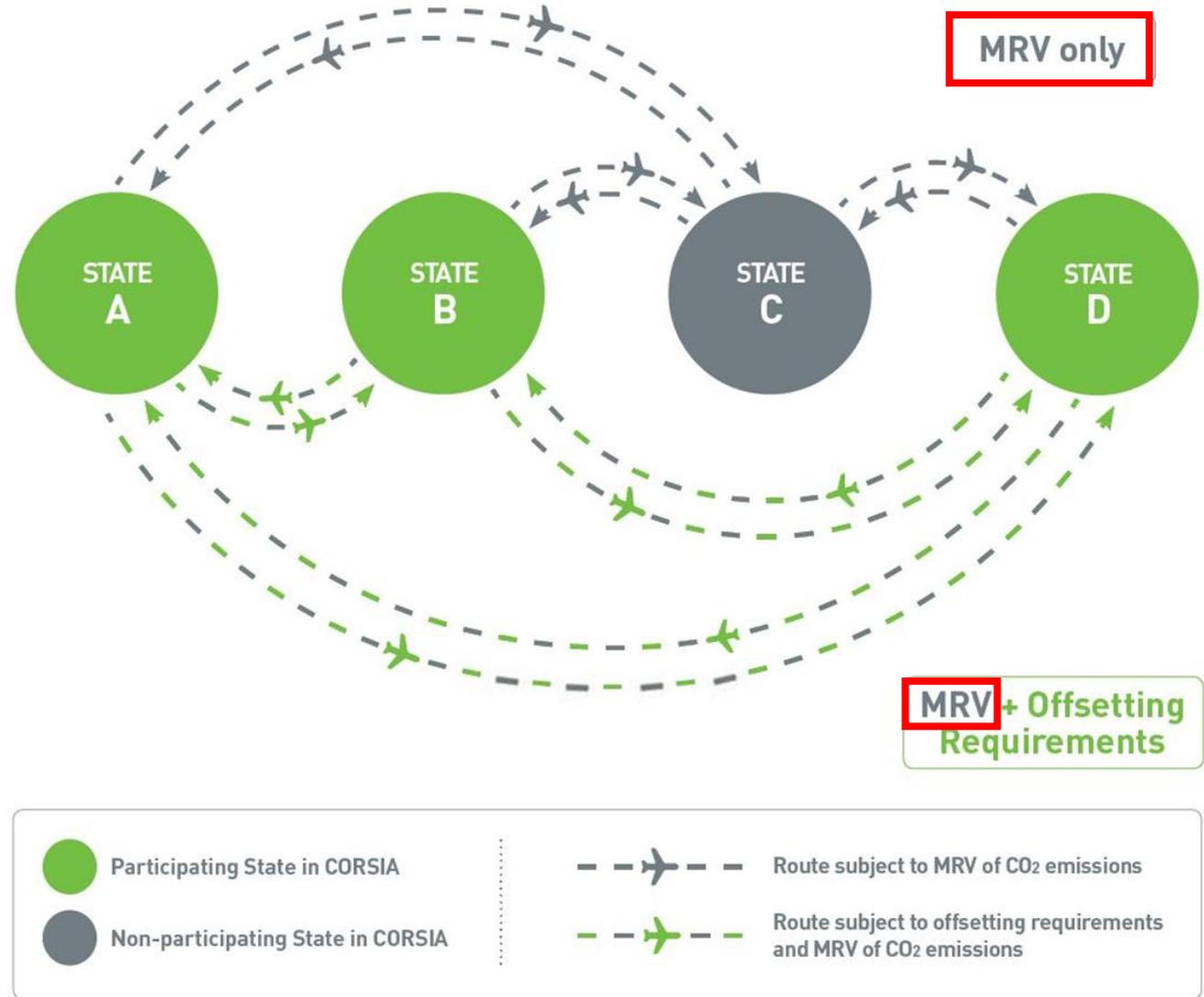
- If an operator falls below the 10 000 tonnes threshold in a given year then they fall outside the scope of applicability of CORSIA, and would not have any requirements in that year.
- It is suggested the operator contact their State to advise them that they are below the threshold. The State may choose to engage with the operator to confirm that the aeroplane operator is out of the scope of applicability

How to address aeroplane operators with annual CO<sub>2</sub> emissions close to the 10 000 tonnes threshold?

- If an operator is close to the threshold, the operator should consider engaging with the State for guidance
- Also, the State should carry out oversight of the operators attributed to it, and engage with any that it considers may be close to or above the threshold
- The aeroplane operator with annual CO<sub>2</sub> emissions below the threshold may choose to voluntarily engage with the State to which it is attributed.

# Applicability of Monitoring Requirements

- All aeroplane operators conducting international flights are required to monitor, report and verify CO<sub>2</sub> emissions from these flights every year starting on 1 January 2019
- Requirement for the MRV of CO<sub>2</sub> emissions is independent from participation in CORSIA offsetting



# Emissions Monitoring Plan

# Monitoring of CO<sub>2</sub> Emissions – Emissions Monitoring Plan

12

- An Emissions Monitoring Plan (EMP) is a collaborative tool between the State and the aeroplane operator. The EMP:
  - Identifies the most appropriate means and methods for CO<sub>2</sub> emissions monitoring on an operator-specific basis; and
  - Facilitates the reporting of required information to the State.
- An aeroplane operator shall submit an EMP to the State to which it is attributed for approval
  - Operator to submit an EMP to State by 28 February 2019
  - State to approve the EMP by 30 April 2019
- The State and aeroplane operator should maintain clear and open communication during development and review of an EMP

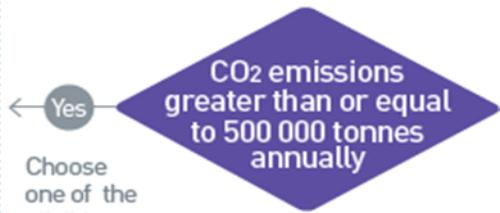
# Emissions Monitoring Options

## Recap:

- An aeroplane operator shall monitor and record its fuel use from international flights in accordance with an eligible monitoring method
- To simplify the estimation and reporting of CO<sub>2</sub> emissions for operators with low level of activity, ICAO has developed the CORSIA CO<sub>2</sub> Estimation and Reporting Tool (CERT)
- Eligibility to use the CERT or one of the eligible fuel use monitoring methods (2019-2020)

### FUEL USE MONITORING METHODS

- Method A
- Method B
- Block-off / Block-on
- Fuel Uplift
- Fuel Allocation with Block Hour



Yes  
Choose one of the eligible monitoring methods

No  
Eligible to use CERT results

**CERT**  
ICAO CORSIA  
CO<sub>2</sub> Estimation and Reporting Tool  
(accessible through the ICAO CORSIA website)



## FUEL USE MONITORING METHODS

Method A

Method B

Block-off / Block-on

Fuel Uplift

Fuel Allocation with Block Hour

- The aeroplane operator, with the exception of an operator eligible to use the CERT, shall choose one out of five fuel use monitoring methods
- Methods represent the most accurate established practices, and are equivalent; there is no hierarchy for selecting a method
- Each method uses different fuel measurement points
- **Specifications** of the methods:
  - **Annex 16, Volume IV, Appendix 2**
- **Guidance** on the implementation of the methods:
  - **ETM, Volume IV (Doc 9501), Chapter 3, 3.1.4**

## FUEL USE MONITORING METHODS

Method A

Method B

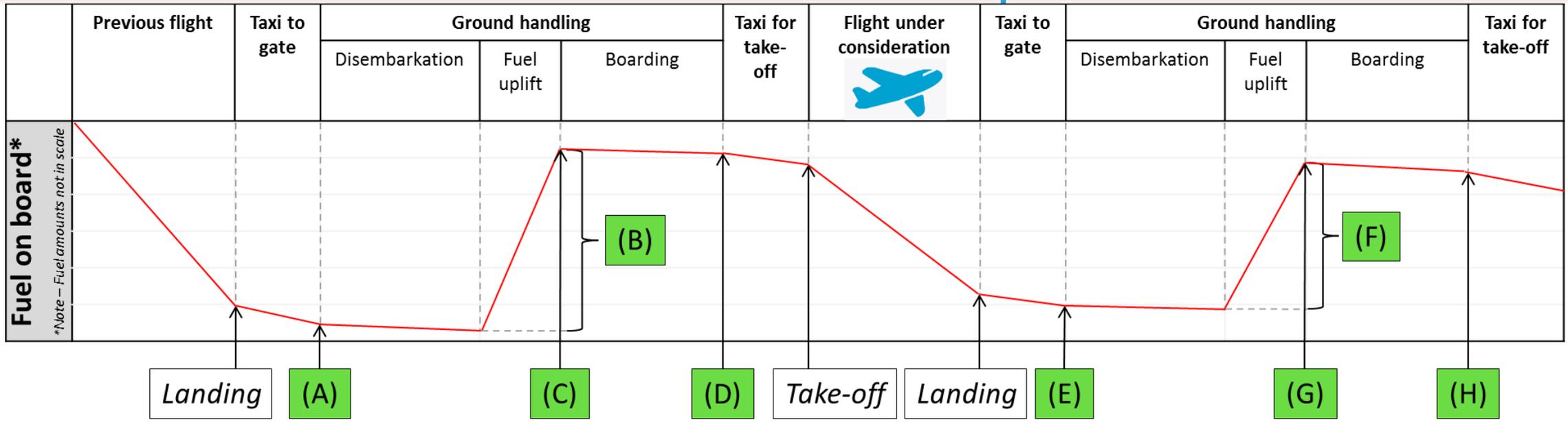
Block-off / Block-on

Fuel Uplift

Fuel Allocation with Block Hour

- The aeroplane operator, with the exception of an operator eligible to use the CERT, shall choose one out of five fuel use monitoring methods
- Methods represent the most accurate established practices, and are equivalent; there is no hierarchy for selecting a method
- Each method uses different fuel measurement points
- **Specifications** of the methods:
  - **Annex 16, Volume IV, Appendix 2**
- **Guidance** on the implementation of the methods:
  - **ETM, Volume IV (Doc 9501), Chapter 3, 3.1.4**

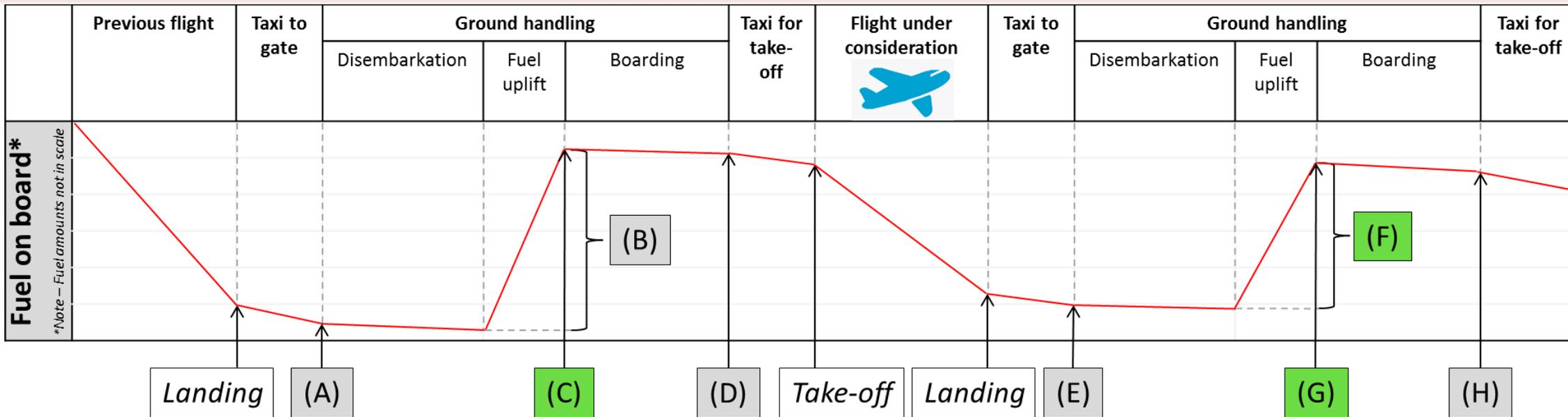
# Fuel use monitoring methods: Fuel measurement points



Fuel Measurement Points		Description of the measurement point
Before the flight under consideration	After the flight under consideration	
(A) Block-on	(E) Block-on	A time when an aeroplane finally stops at the end of the flight
(B) Fuel uplift	(F) Fuel uplift	Measurement of fuel provided by the fuel supplier, as documented in the fuel delivery notes or invoices for each flight (in litre)
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift	Amount of fuel contained in aeroplane tanks once fuel uplifts for the flight under consideration are complete (in tonnes)
(D) Block-off	(H) Block-off	A time when an aeroplane first moves for the purpose of taking off

# Fuel use monitoring methods:

## Method A



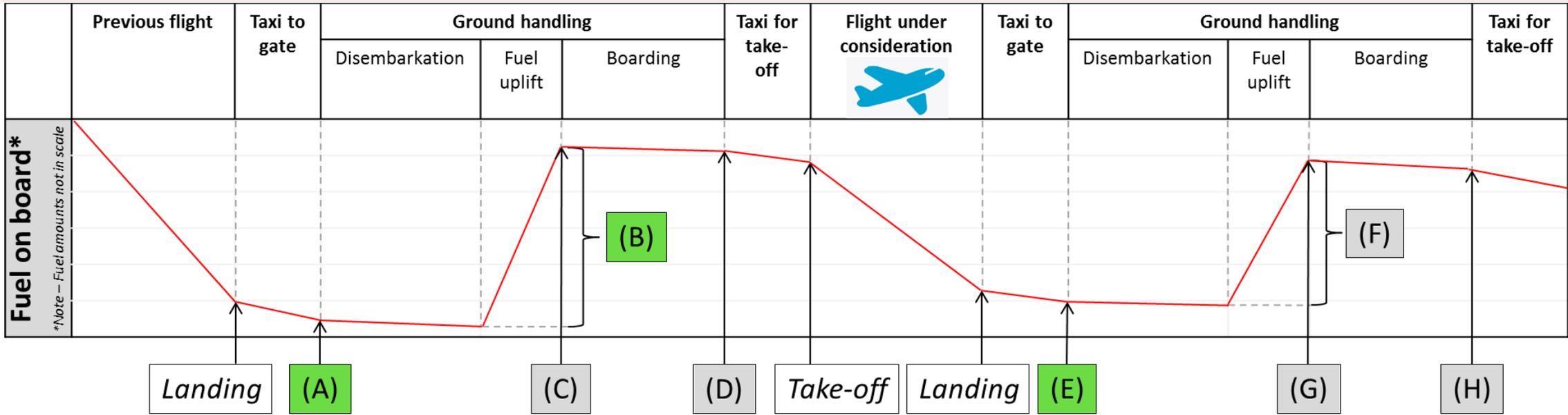
Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring Method: METHOD A	
Fuel used = C-G+F	

### FUEL USE MONITORING METHODS

- Method A
- Method B
- Block-off / Block-on
- Fuel Uplift
- Fuel Allocation with Block Hour

# Fuel use monitoring methods:

## Method B

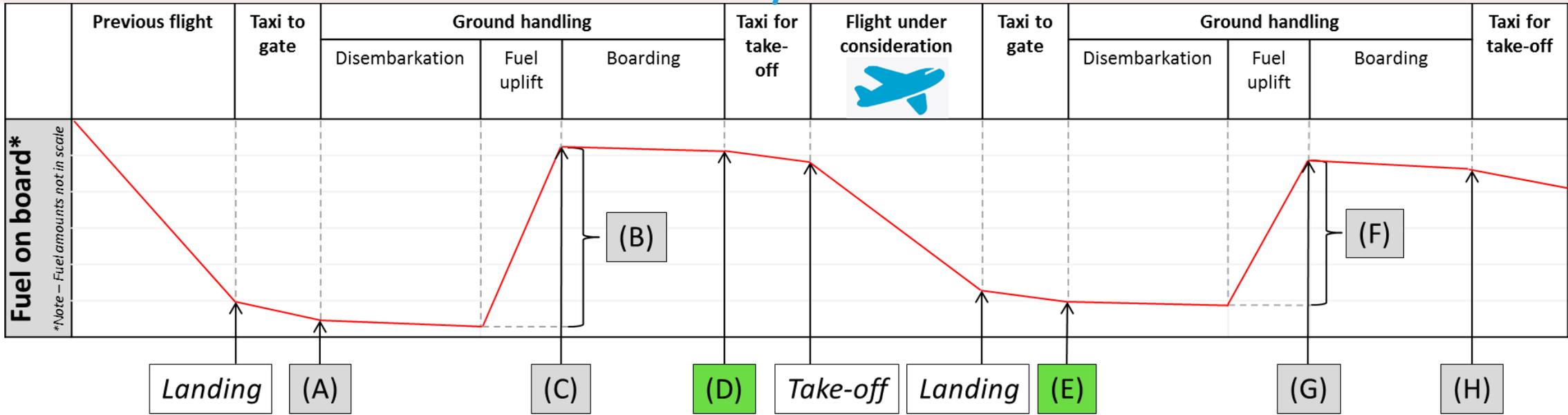


Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring Method: METHOD B	
Fuel used = A-E+B	

### FUEL USE MONITORING METHODS

- Method A
- Method B**
- Block-off / Block-on
- Fuel Uplift
- Fuel Allocation with Block Hour

# Fuel use monitoring methods: Block-off / Block-on



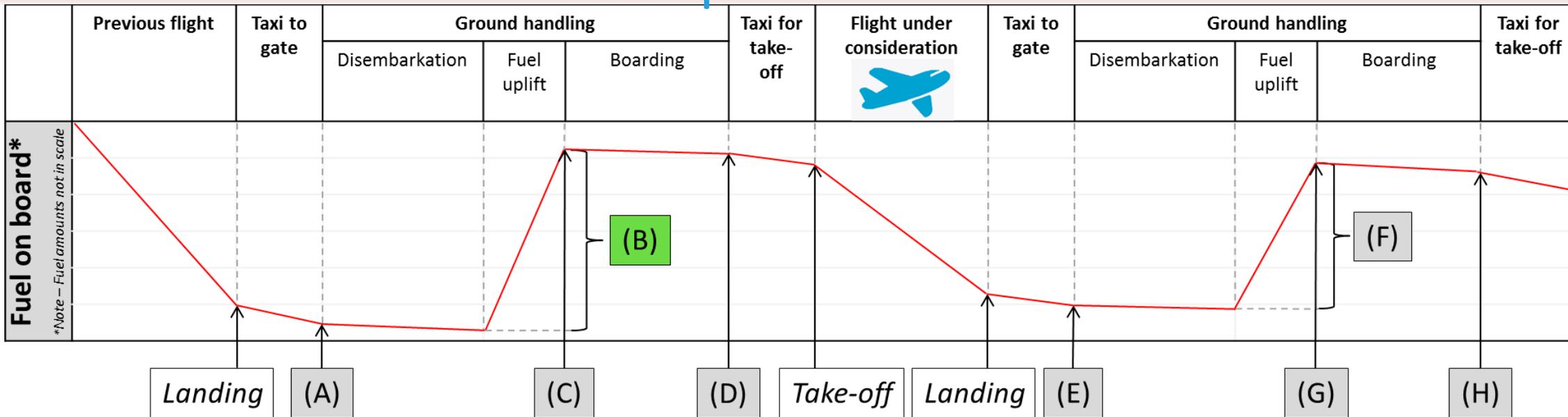
Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring Method: Block-off / Block-on	
Fuel used = D-E	

## FUEL USE MONITORING METHODS

- Method A
- Method B
- Block-off / Block-on**
- Fuel Uplift
- Fuel Allocation with Block Hour

# Fuel use monitoring methods:

## Fuel uplift

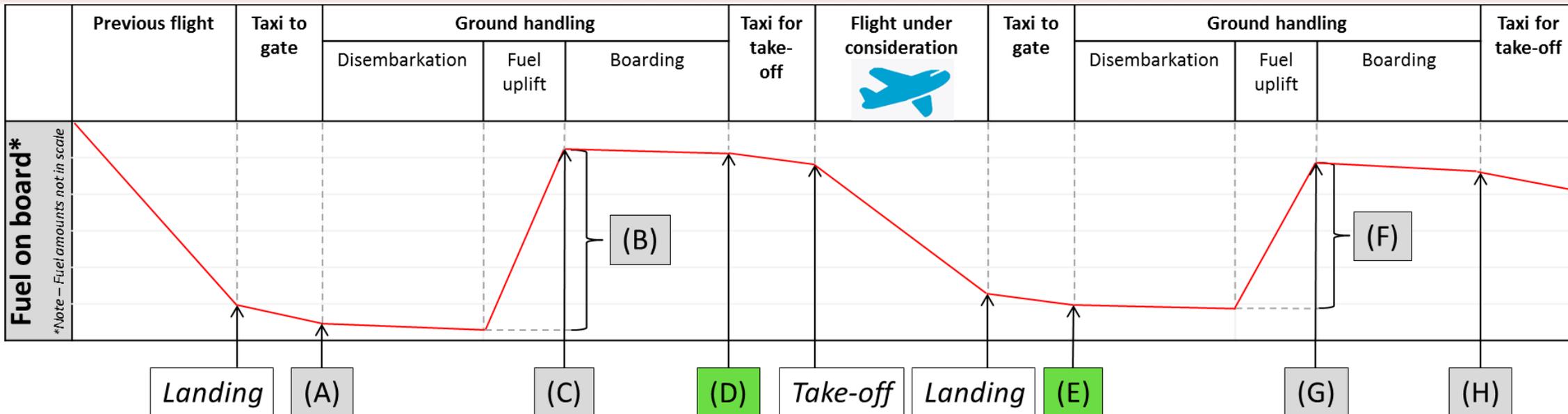


Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
<b>(B) Fuel uplift</b>	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring Method: Fuel Uplift	
<b>Fuel used = B</b>	

### FUEL USE MONITORING METHODS

- Method A
- Method B
- Block-off / Block-on
- Fuel Uplift**
- Fuel Allocation with Block Hour

# Fuel use monitoring methods: Fuel allocation with block hour



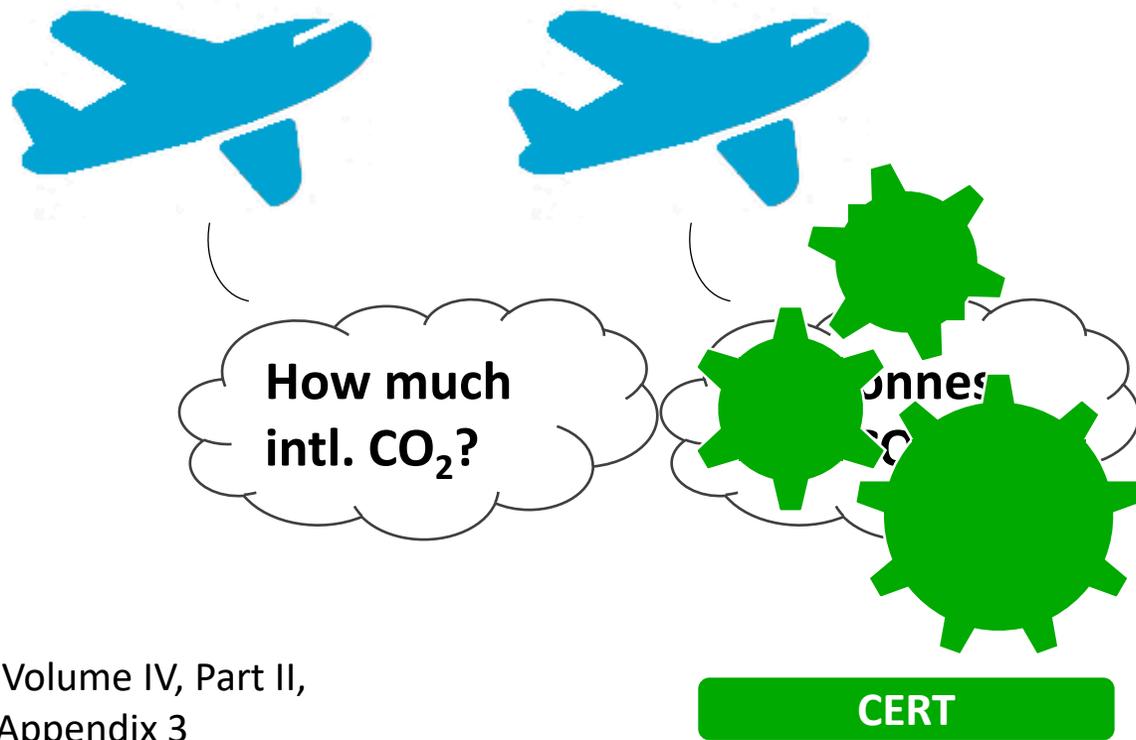
Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Block-on time
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Block-off time	(H) Fuel at block-off
Fuel Use Monitoring Method: Fuel Allocation with Block Hour	
Fuel used = Block hour * Average fuel burn ratio	

## FUEL USE MONITORING METHODS

- Method A
- Method B
- Block-off / Block-on
- Fuel Uplift
- Fuel Allocation with Block Hour**

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

**CERT** is an ICAO tool to help aeroplane operators estimate and report their international aviation emissions



# Who can use the CERT?

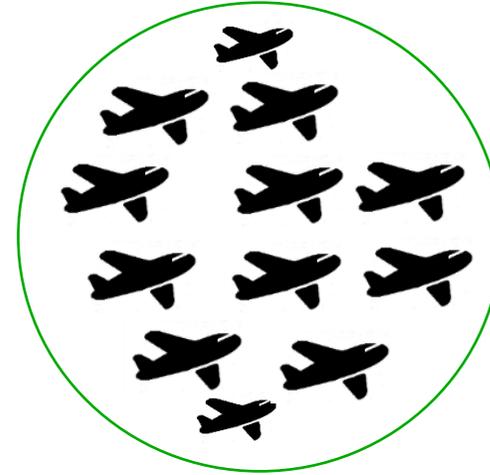
**ALL aeroplane operators can use the CERT for a preliminary CO<sub>2</sub> assessment...**



Small operators



Medium operators



Large operators



**... but only some aeroplane operators can use the CERT as primary\* means for CO<sub>2</sub> estimation and reporting**

\* Note: All aeroplane operators can use the CERT to fill data gaps (up to a certain number of flights)

Note: Aeroplane operators eligible to use the CERT are also encouraged to use one of the five Fuel Use Monitoring Methods to monitor CO<sub>2</sub> emissions from international flights.

# Who can use the CERT?

CERT	Aeroplane operators international CO <sub>2</sub> emissions (tonnes) 2019-2020*		
	Function / Use	≤ 10K CO <sub>2</sub>	< 500K CO <sub>2</sub>
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 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 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 CERT during 2020.

## The CERT will have up to 4 functionalities:

CERT CO <sub>2</sub> estimation & reporting tool			
Year of validity	2018 (Version 2018)	2019-2020 (Version 2019-2020)	2021-2035 (Version 2021-2035)
Estimation of CO <sub>2</sub> for determination of simplified compliance procedures eligibility	Yes	Yes	Yes
Report generation functionality	Partial*	Yes	Yes
Monitoring (estimating CO <sub>2</sub> )	No	Yes	Yes
List of States pairs subject to offsetting requirement	No	No	Yes

\* The 2018 version of the CERT includes the functionality to generate a summary report of the assessment of the estimation of the aeroplane operators CO<sub>2</sub> emissions. The report can be used as supporting evidence for the operator's Emissions Monitoring Plan.



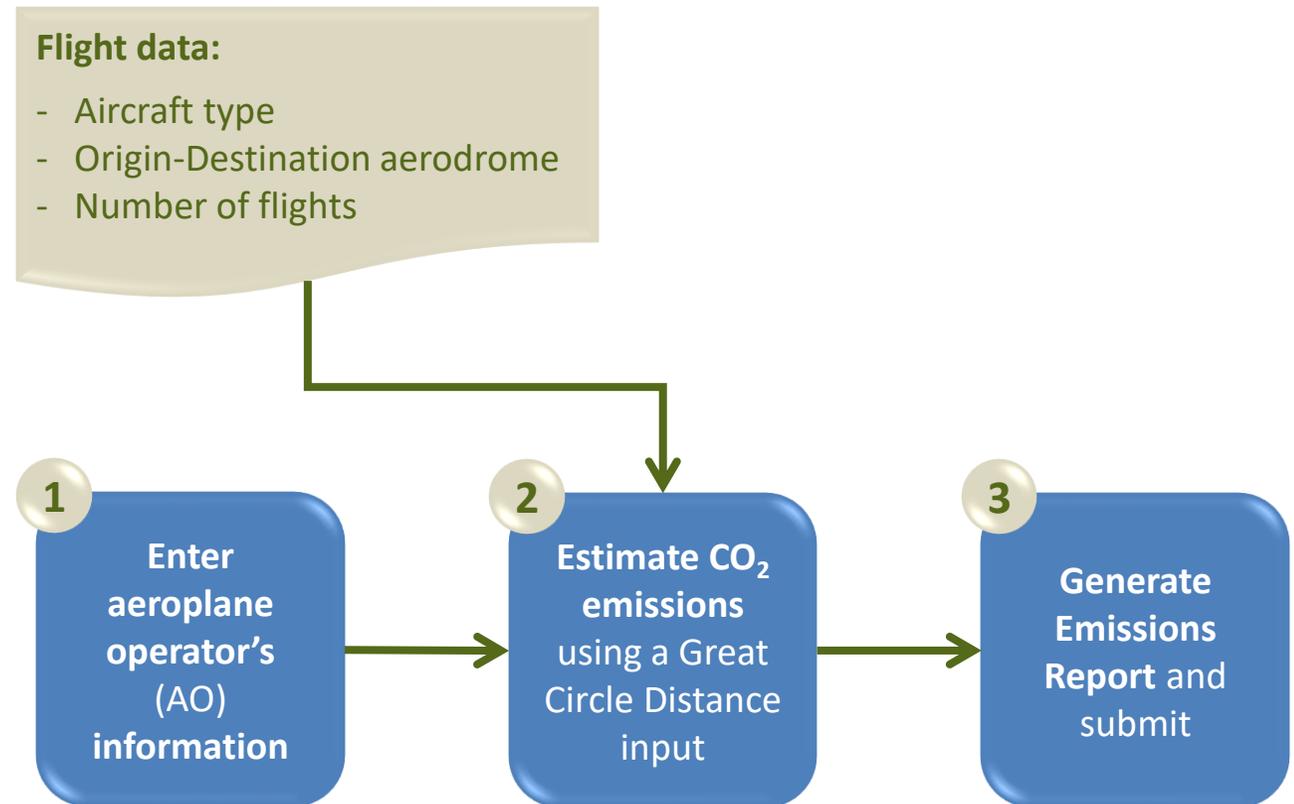
## The CERT comprises a three-step process

(1) Entering aeroplane operator's basic information

(2) Entering flight data to estimate CO<sub>2</sub> emissions by entering:

- a) Aeroplane type by ICAO type designator
- b) Origin-Destination aerodrome
- c) Number of flights (if batches of flights are entered)

(3) Generating the summary assessment report in support for FMP submission



## What are the benefits of the CERT?

- ✓ **Easy-to-use tool**
- ✓ **Simplifies CO<sub>2</sub> estimation tasks for all users**  
(Operators and States)
- ✓ **ICAO-approved tool**
- ✓ **Available free of charge**
- ✓ **Available on the ICAO CORSIA website for download**

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

- Version 2018 of the ICAO CORSIA CERT is available for download via the CORSIA webpage: [www.icao.int/corsia](http://www.icao.int/corsia)
- In addition, the document *ICAO CORSIA CO<sub>2</sub> Estimation and Reporting Tool (CERT): Design, Development and Validation*, containing the technical methodologies of version 2018 of the ICAO CORSIA CERT, is available or download via the CORSIA webpage: [www.icao.int/corsia](http://www.icao.int/corsia)
- Demonstration of the CERT:

[ICAO CORSIA CO<sub>2</sub> Estimation and Reporting Tool](http://www.icao.int/corsia)

- EMP contents are included in the Annex 16, Volume IV, Appendix 4
- Main components of an EMP are:

1. Aeroplane operator identification
2. Fleet and operations data
3. Methods and means of calculating emissions from international flights
4. Data management, data flow and control



Reference: Annex 16, Volume IV, Part II, Chapter 2, 2.2.2, and Appendix 4

**CORSIA**  
EMISSIONS MONITORING PLAN (EMP)

**CONTENTS**

- 1 [Version control of Emissions Monitoring Plan](#)
- 2 [Aeroplane operator identification and description of activities](#)
- 3 [Fleet and operations data](#)
- 4 [Methods and means for calculating emissions](#)
  - 4.1 [Fuel Use Monitoring Method: Method A](#)
  - 4.2 [Fuel Use Monitoring Method: Method B](#)
  - 4.3 [Fuel Use Monitoring Method: Block-off / Block-on](#)
  - 4.4 [Fuel Use Monitoring Method: Fuel Uplift](#)
  - 4.5 [Fuel Use Monitoring Method: Fuel Allocation with Block Hour](#)
  - 4.6 [ICAO CORSIA CO<sub>2</sub> Estimation and Reporting Tool \(CERT\)](#)
- 5 [Data management, data flow, control system, risk analysis and data gaps](#)

**Template Information**

Template provided by:	
Version (publication date):	

*Note: For the purpose of this template, international flight is defined as in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 2, 2.1.*

## Template of Emissions Monitoring Plan (from aeroplane operator to State)

- It is recommended that an aeroplane operator uses the standardized Emissions Monitoring Plan template to develop the Emissions Monitoring Plan for submission to its State
- A standardized Emissions Monitoring Plan template in the format of a spreadsheet is available to aeroplane operators for download via the CORSIA webpage: [www.icao.int/corsia](http://www.icao.int/corsia)
- Demonstration of the EMP template:

[EMP template](#)

# Emissions Monitoring Plan

## How to check the EMP using the ETM checklist

---

Reference material:

- ETM, Volume IV (Doc 9501): Chapter 3, 3.1.3.1; Table 3-2



## Recap:

- An operator submits an EMP to the State; the State reviews and approves the EMP
- An operator resubmits the EMP for review and approval by the State if a material change is made to the information contained within the EMP (see Annex 16, Volume IV, Part II, Chapter 2, 2.2.2.3)

## How to check the EMP by the State?

- The ETM, Volume IV (Doc 9501): Chapter 3, 3.1.3, provides additional guidance on the initial submission, amendments and approval of operators' EMPs
- Table 3-2 of ETM, Volume IV (Doc 9501) contains an Emissions Monitoring Plan checklist, including the identification of 'material change'
- Compare the EMP template with the EMP checklist
- Adjust the EMP checklist regarding special circumstances and internal processes and approaches to administration in your State



# Review and Approval of the Emissions Monitoring Plan

# State's Review and Approval of the Emissions Monitoring Plan – Level of Data Aggregation

35

- The State shall decide on the level of aggregation (i.e., State pair or aerodrome pair) for which an aeroplane operator shall report the number of international flights and CO<sub>2</sub> emissions
- The State shall inform an aeroplane operator whether the operator shall report at the level of State pair or aerodrome pair during the approval process for the Emissions Monitoring Plan.

- Guidance material on submission, review, approval, and revisions of Emissions Monitoring Plans is included in the Environmental Technical Manual (ETM), Volume IV
- Structure of the EMP Checklist follows the structure of the Emissions Monitoring Plan:

I. Aeroplane operator identification

II. Fleet and operations data

III. Methods/Mean of calculating emissions from international flights

IV. Data management, data flow and control



# EMP Review Checklist Section I – Aeroplane Operator Identification (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Checklist for State review</i>
Identification of aeroplane operator with legal responsibility.	Subject to review and approval by the State; reviewer to review and confirm document(s).
Name and address.	Subject to review and approval by the State; reviewer to review and confirm document(s).
Identifying information for attributing the aeroplane operator to a State: either unique ICAO Designator (or Designators) used in the call sign for air traffic control purposes; copy of the air operator certificate; or place of juridical registration.	Subject to review and approval by the State; reviewer to review and confirm document(s)
Details of ownership structure relative to any other aeroplane operators with international flights, including identification of whether the aeroplane operator is a parent company, a subsidiary and/or has a parent and/or subsidiaries.	Information provided? Check “Yes” or “No”.



# EMP Review Checklist Section II – Fleet and Operations Data (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Checklist for State review</i>
<p>List of the aeroplane types with maximum certificated take-off mass (MTOM) greater than 5 700 kg and types of aviation fuel (e.g., Jet-A, Jet-A1, Jet-B, Aviation Gasoline) used in aeroplane operated in international flight at the time of submission of the Emissions Monitoring Plan, recognizing that there may be changes over time.</p>	<p>Information provided? Check “Yes” or “No.”</p>
<p>Identify the aeroplane operator’s means for having its international flights attributed to it: ICAO Designator; or registration marks.</p>	<p>Subject to review and approval by the State; reviewer to review and confirm means for attribution of flights and documentation.</p>
<p>Information on procedures for how changes in aeroplane fleet and fuel used will be tracked and integrated in emissions monitoring.</p>	<p>Subject to review and approval by the State; reviewer to review and confirm that sufficient procedures are in place.</p>

# EMP Review Checklist Section III – Methods/Means of Calculating Emissions from International Flights (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Checklist for State review</i>
<p>If the aeroplane operator will be using the ICAO CORSIA CERT, identify the input method into the ICAO CORSIA CERT (i.e., Great Circle Distance input method or Block Time input method).</p>	<p>Subject to review and approval by the State; reviewer to review and confirm that aeroplane operator has properly identified an applicable input method into the ICAO CORSIA CERT.</p>
<p>For aeroplane operators using a Fuel Use Monitoring Method, provide information on the specific Fuel Use Monitoring Method as described in Annex 16, Volume IV, Appendix 2, whether the aeroplane operator plans to use different methods for different aeroplane fleet types.</p>	<p>Subject to review and approval by the State; reviewer to review and confirm that aeroplane operator has properly identified an applicable method or methods.</p>
<p>For aeroplane operators using a Fuel Use Monitoring Method, provide information on the procedures for determining and recording fuel density values (standard or actual) as used for operational and safety reasons and provide a reference to the relevant aeroplane operator documentation.</p>	<p>Subject to review and approval by the State; reviewer to review and confirm that aeroplane operator has identified means for determining and recording fuel density and provided a reference to the relevant documentation.</p>



# EMP Review Checklist Section IV – Data Management, Data Flow and Control (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Checklist for State review</i>
<p>How data management will be done by the aeroplane operator and by who.</p>	<p>Subject to review and approval by the State; reviewer to review and confirm that aeroplane operator has a data management plan in place to track and report required information.</p>
<p>Handling data gaps and erroneous data values: if data is missing/incorrect such that the aeroplane operator cannot determine emissions for a flight in accordance with the specified procedures, what secondary data reference sources would be used as an alternative? In cases where a secondary data reference source is not available, what method would be used to fill data gaps?</p>	<p>Subject to review and approval by the State; reviewer to review and confirm that aeroplane operator has noted methodology for handling data gaps and erroneous data values.</p>
<p>Documentation and record keeping plan.</p>	<p>Information provided? Check “Yes” or “No.”</p>



# Revisions of the Emissions Monitoring Plan

- The aeroplane operator shall resubmit the Emissions Monitoring Plan to the State for approval if “a material change” is made to the Plan
- A material change would affect e.g.:
  - The status or eligibility for an option under the emissions monitoring requirements; or
  - Operator’s approach to monitoring.
- The aeroplane operator shall also inform the State of changes that would affect the State’s oversight, even if the changes do not fall within the definition of a material change, e.g.:
  - Change in corporate name / address.



# EMP Revision Checklist Section I – Aeroplane Operator Identification (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Material change or notice of change</i>
Identification of aeroplane operator with legal responsibility.	<b>Can be material</b> – If legal entity or means to identify legal entity changes; resubmit and subject to re-approval.
Name and address.	<b>Can be material</b> – If changes to name and/or address are due to a change in the legal entity or means for the State to identify legal entity changes; resubmit and subject to re-approval.
Identifying information for attributing the aeroplane operator to a State: either unique ICAO Designator (or Designators) used in the call sign for air traffic control purposes; copy of the air operator certificate; or place of juridical registration.	A change in the identifying information would be <b>material</b> ; resubmit and subject to re-approval.
Details of ownership structure relative to any other aeroplane operators with international flights, including identification of whether the aeroplane operator is a parent company, a subsidiary and/or has a parent and/or subsidiaries.	<b>Not material unless a change in corporate structure changed which entity is the aeroplane operator subject to requirements from Annex 16, Volume IV</b> – Changes that do not affect which entity is the aeroplane operator would be handled as simple notice to the authority in the annual Emissions Report.



# EMP Revision Checklist Section II – Fleet and Operations Data (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Material change or notice of change</i>
<p>List of the aeroplane types with maximum certificated take-off mass (MTOM) greater than 5 700 kg and types of aviation fuel (e.g., Jet-A, Jet-A1, Jet-B, Aviation Gasoline) used in aeroplane operated in international flight at the time of submission of the Emissions Monitoring Plan, recognizing that there may be changes over time.</p>	<p><b>Not material</b> – changes in this could be handled as simple notice to the authority in the annual Emissions Report.</p>
<p>Identify the aeroplane operator’s means for having its international flights attributed to it: ICAO Designator; or registration marks.</p>	<p>A change in the means for having international flights attributed; <b>resubmit</b> the Emissions Monitoring Plan and subject to re-approval.</p>
<p>Information on procedures for how changes in aeroplane fleet and fuel used will be tracked and integrated in emissions monitoring.</p>	<p><b>Can be material</b> – if the aeroplane operator changes the procedures, that would be subject to re-review and re-approval by the State.</p>

# EMP Revision Section III – Methods/Means of Calculating Emissions from International Flights (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Material change or notice of change</i>
<p>If the aeroplane operator will be using the ICAO CORSIA CERT, identify the input method into the ICAO CORSIA CERT (i.e., Great Circle Distance input method or Block Time input method).</p>	<p><b>Can be material</b> – If the aeroplane operator changes methods that would be subject to review and approval by the State; reviewer to review and confirm.</p>
<p>For aeroplane operators using a Fuel Use Monitoring Method, provide information on the specific Fuel Use Monitoring Method as described in Annex 16, Volume IV, Appendix 2, whether the aeroplane operator plans to use different methods for different aeroplane fleet types.</p>	<p><b>Can be material</b> – If the aeroplane operator changes methods that would be subject to review and approval by the State; reviewer to review and confirm.</p>
<p>For aeroplane operators using a Fuel Use Monitoring Method, provide information on the procedures for determining and recording fuel density values (standard or actual) as used for operational and safety reasons and provide a reference to the relevant aeroplane operator documentation.</p>	<p><b>Can be material</b> – if the operator changes its procedures for determining and/or recording fuel density values that would be subject to re-review and reapproval by the State.</p>

# EMP Revision Checklist Section IV – Data Management, Data Flow and Control (Selected Examples)

<i>Emissions Monitoring Plan provision</i>	<i>Material change or notice of change</i>
<p>How data management will be done by the aeroplane operator and by who.</p>	<p><b>Can be material</b> – If the aeroplane operator changes the underlying approach to data management, that would be subject to re-review and re-approval by the State.</p>
<p>Handling data gaps and erroneous data values: if data is missing/incorrect such that the aeroplane operator cannot determine emissions for a flight in accordance with the specified procedures, what secondary data reference sources would be used as an alternative? In cases where a secondary data reference source is not available, what method would be used to fill data gaps?</p>	<p><b>Can be material</b> – If the aeroplane operator changes the means for handling data gaps significant risks, that would be subject to re-review and re-approval by the State.</p>
<p>Documentation and record keeping plan.</p>	<p><b>Not material.</b></p>



- Follow-up actions for an operator and State in a case of material and non-material change

Material change?	Follow-up actions for an operator and State
Yes	<b>Operator: Resubmit the EMP to State</b> <b>State: Review and re-approve the EMP</b>
No	<b>Operator: Notify the changes to the State as a part of the annual Emissions Report</b> <b>State: Receive and take note of the changes</b>

# State's Review of the Emissions Monitoring Plan – Some Specific Cases

What happens if an aeroplane operator does not have an approved Emissions Monitoring Plan on 1 January 2019?

- Operator should prepare and submit EMP as soon as possible
- If operator does not have an approved EMP by 1 Jan 2019, it shall monitor and record its emissions in accordance with the eligible monitoring method outlined in the EMP that it will submit, or has submitted

What if an aeroplane operator does not have sufficient information to use a Fuel Use Monitoring Method?

- The State can approve the use of the ICAO CORSIA CERT for a period lasting no later than 30 June 2019

What if an aeroplane operator's Emissions Monitoring Plan is inconsistent with an eligible Fuel Use Monitoring Method?

- The State can approve a different eligible Fuel Use Monitoring Method within the EMP for a period lasting no later than 30 June 2019



# FAQs regarding the EMP and Monitoring of CO<sub>2</sub> Emissions

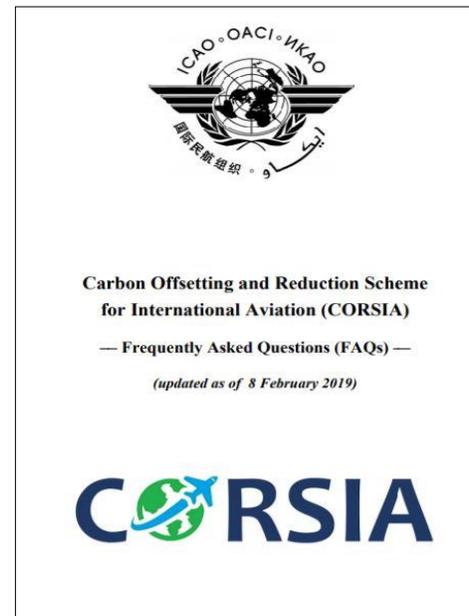
A selection of Frequently Asked Questions (FAQs) on CORSIA and related responses are available for download via the CORSIA webpage: [www.icao.int/corsia](http://www.icao.int/corsia)

What are the contents of an Emissions Monitoring Plan?

Does the Emissions Monitoring Plan have to be submitted annually?

Can an aeroplane operator change its Fuel Use Monitoring Method?

What is an Emissions Monitoring Plan and why is it needed?



What will happen if an aeroplane operator exceeds the eligibility threshold to use ICAO CORSIA CERT during a given year?

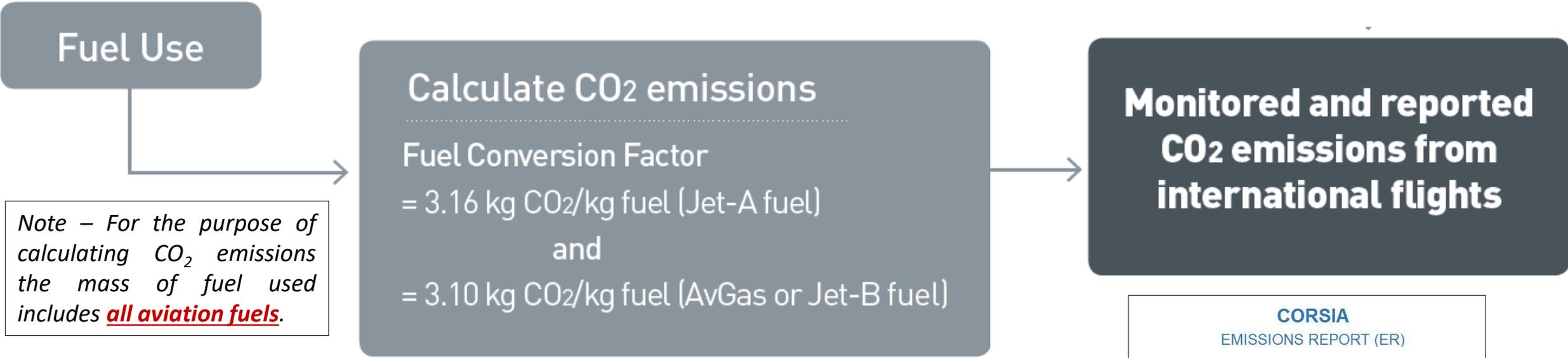
# Calculation of CO<sub>2</sub> Emissions and Monitoring of CORSIA Eligible Fuels

- After an aeroplane operator monitors its fuel use in accordance with an approved EMP, it shall calculate CO<sub>2</sub> emissions from the fuel burn
- ICAO CORSIA CERT automatically estimates the CO<sub>2</sub> emissions for aeroplane operators who have been approved to use the CERT
- An operator using a Fuel Use Monitoring Method shall determine the CO<sub>2</sub> emissions by using the following equation:

$$CO_2 \text{ Emissions} = \text{Mass of fuel} * \text{Fuel Conversion Factor of given fuel type}$$

# Calculation of CO<sub>2</sub> Emissions from Fuel Use

$$CO_2 \text{ Emissions} = \text{Mass of fuel} \times \text{Fuel Conversion Factor of given fuel type}$$



Note – For the purpose of calculating CO<sub>2</sub> emissions the mass of fuel used includes **all aviation fuels**.

• Information on CO<sub>2</sub> emissions will be reported as a part of an aeroplane operator’s Emissions Report

**CORSIA**  
EMISSIONS REPORT (ER)

**CONTENTS**

- 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](#)
- 5. [Reporting](#)
- 5.1 [Reporting - State pairs](#)
- 5.2 [Reporting - Aerodrome pairs](#)
- 6 [Data gaps](#)

**Template Information**

Template provided by:	
Version (publication date):	

Note: For the purpose of this template, international flight is defined as in Annex 16, Volume IV, Part II, Chapter 1, 1.1.2, and Chapter 2, 2.1.



- Purchasing and blending records will form the basis for monitoring of the use of CORSIA eligible fuels
- For the purpose of calculating the CO<sub>2</sub> emissions, the mass of fuel used includes all aviation fuel
- The emissions reductions from the use of CORSIA eligible fuels are calculated as part of the CO<sub>2</sub> offsetting requirements



# Questions?



---

Thank You