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ENVIRONMENT



Emissions Monitoring Plans and Monitoring of CO₂ Emissions

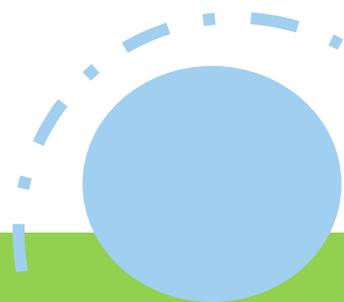
ICAO/SASO ENV Workshop

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- 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 average)
 - Purpose of MRV is to collect information on international aviation CO₂ emissions on an annual basis and compare emissions from 2021 against the baseline emissions

Monitoring

Monitoring of CO₂ emissions is either based on a Fuel Use Monitoring Method, or the use of the ICAO CORSIA CERT.

Reporting

CO₂ emissions will be reported from aeroplane operators to their State Authority, and from States to ICAO.

Verification

CO₂ emissions information is accurate and free of errors.

- Monitoring, reporting and verification of aeroplane operator's annual CO₂ emissions – Annex 16, Volume IV, Chapter 2

2.1 Applicability of MRV Requirements

2.2 Monitoring of CO₂ Emissions

2.3 Reporting of CO₂ Emissions

2.4 Verification of CO₂ Emissions

2.5 Data Gaps

2.6 Error Correction to Emissions Reports

CHAPTER 2. MONITORING, REPORTING AND VERIFICATION (MRV) OF AEROPLANE OPERATOR ANNUAL CO₂ 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 CO₂ 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 CO₂ 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 CO₂ emissions below the threshold may choose to voluntarily engage with the State to which it is attributed.*

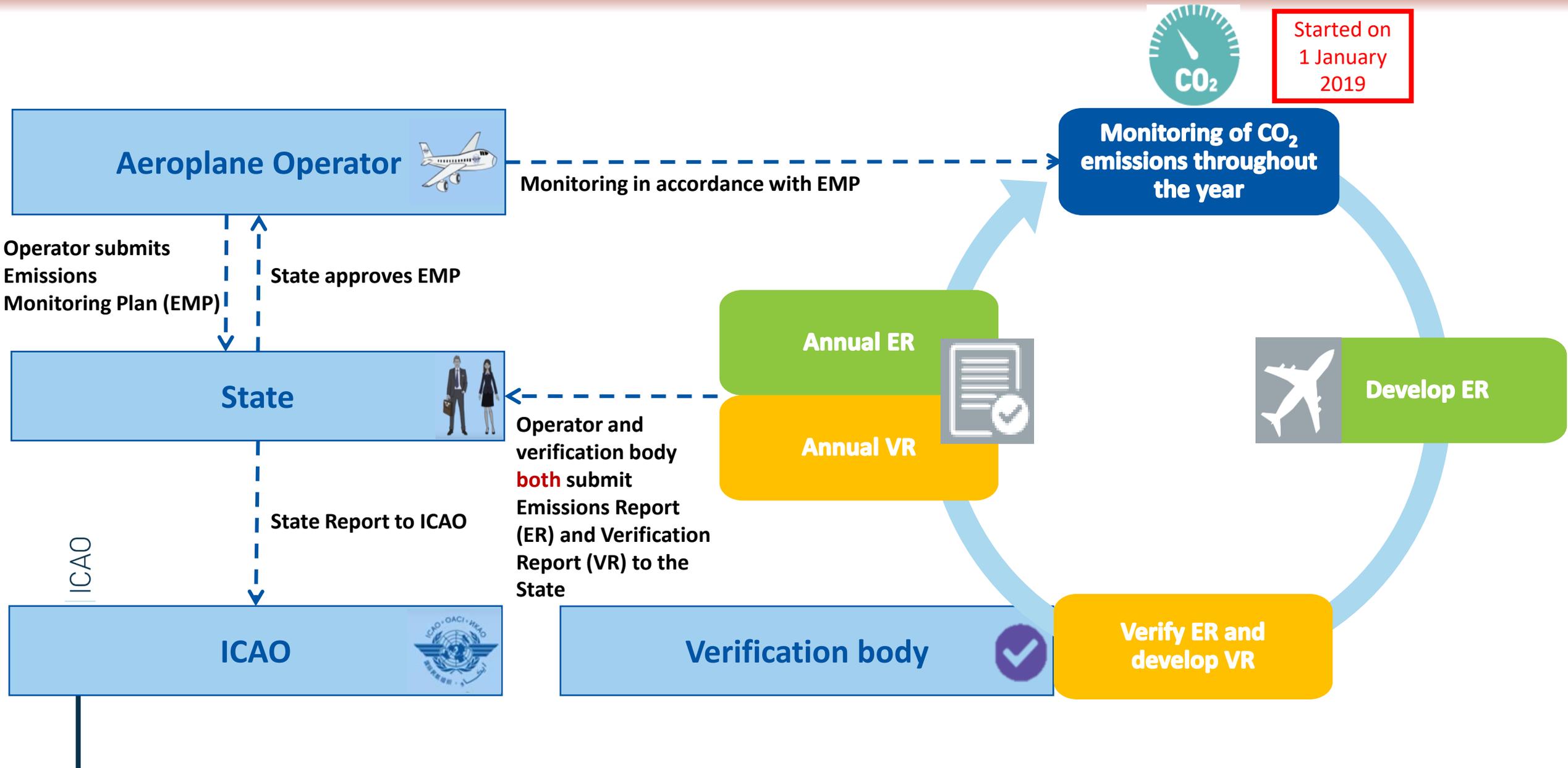
Note.— See Attachment B Figure B-1 for a process flowchart on the determination of the applicability of Chapter 2 to international flights, as defined in 1.1.2.

2.2 Monitoring of CO₂ 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 CO₂ Monitoring Requirements under CORSIA

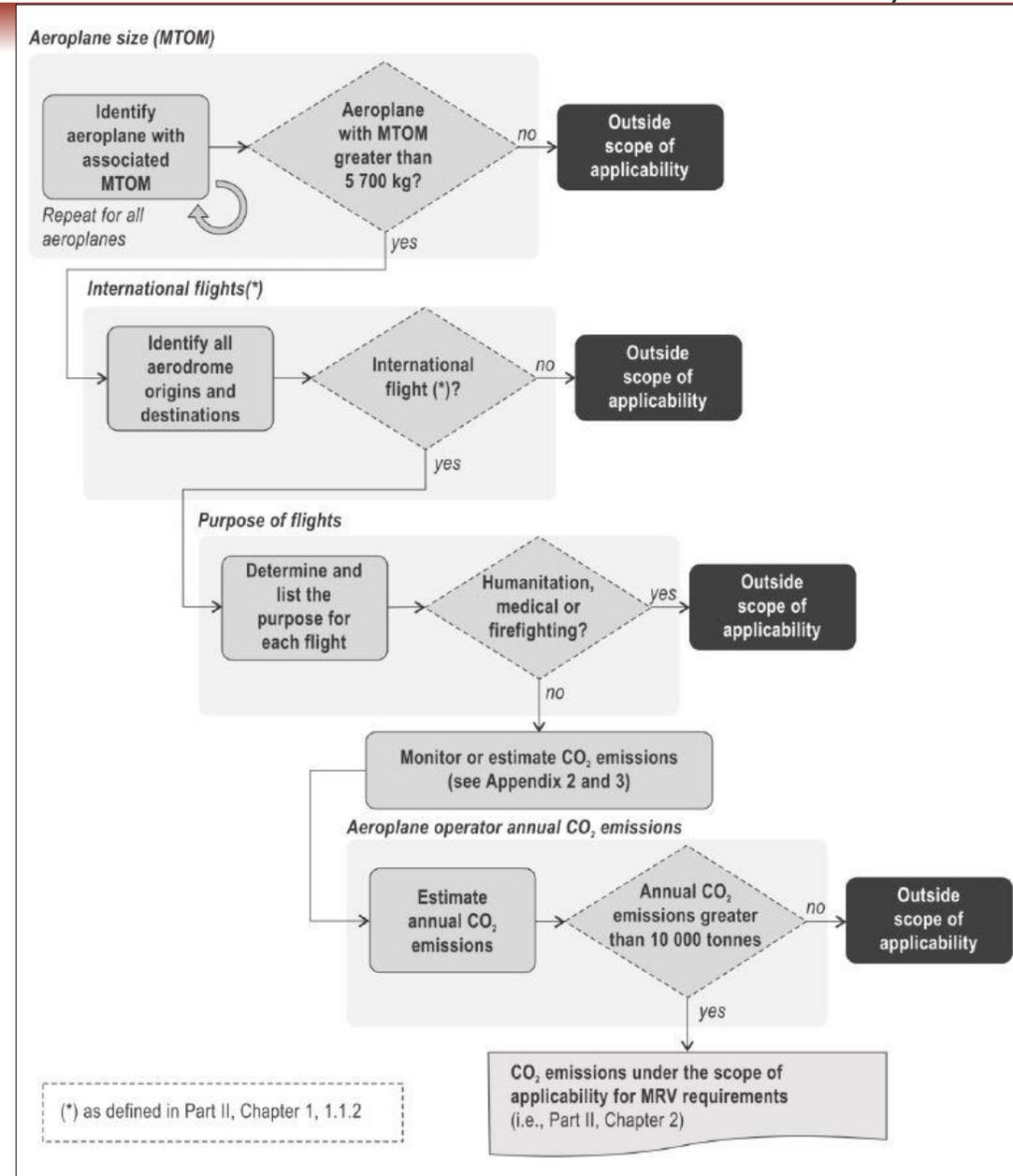
Applicability of Monitoring Requirements

- 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 CO₂ emissions greater than 10,000 tonnes



Applicability of Monitoring Requirements: Illustrative Example of the 10,000 tonnes of CO₂ 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 CO₂ emissions
10,000+ tonnes**

From	To	Annual CO ₂ 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 CO₂ per year be included in CORSIA?

- An operator that produces annual CO₂ 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

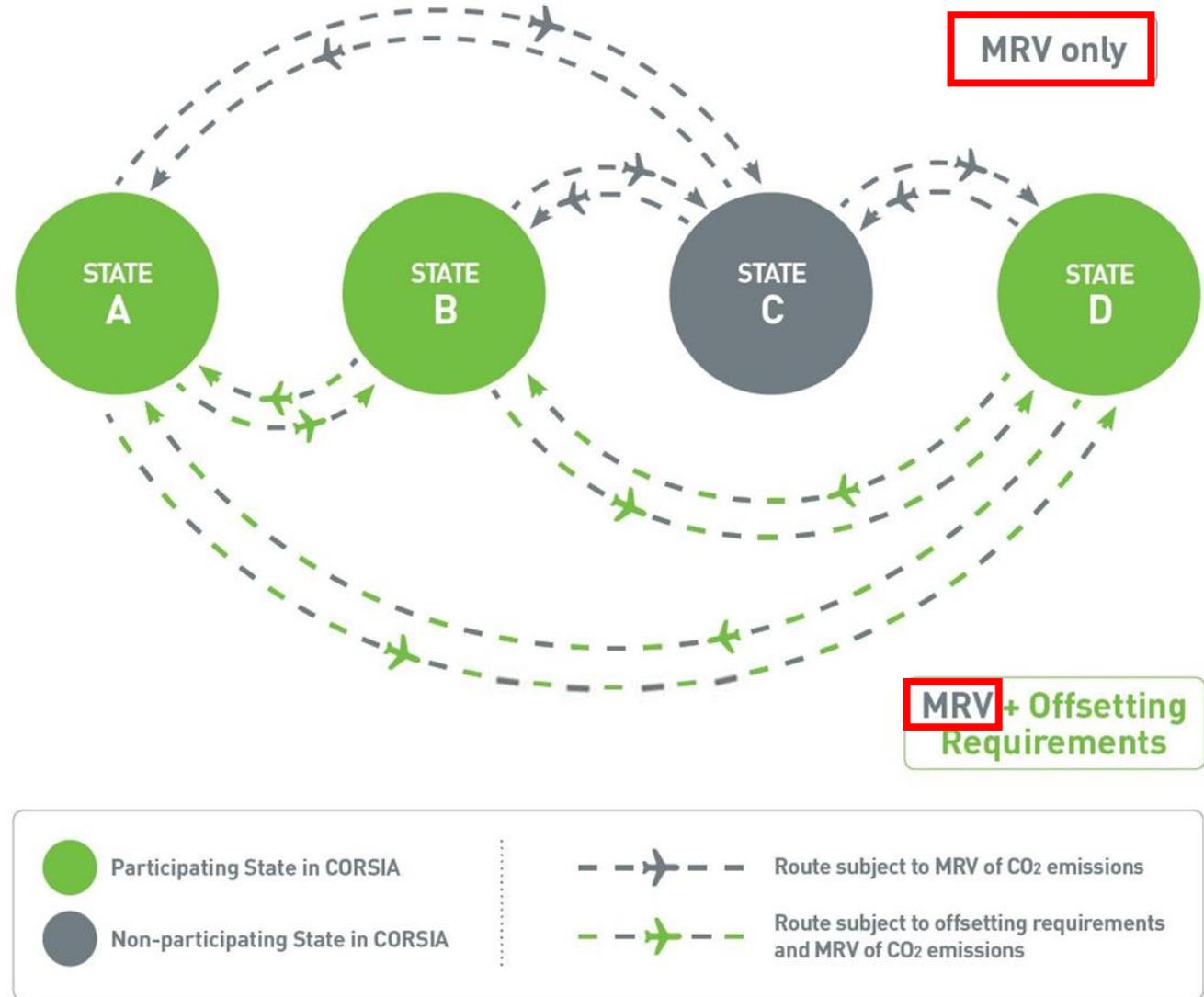
What are the actions for an aeroplane operator, who has been covered by CORSIA, but now drops below the 10 000 tonnes of CO₂ threshold?

- 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 CO₂ 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 CO₂ emissions below the threshold may choose to voluntarily engage with the State to which it is attributed.

- All aeroplane operators conducting international flights are required to monitor, report and verify CO₂ emissions from these flights every year starting from 1 January 2019
- Requirement for the MRV of CO₂ emissions is independent from participation in CORSIA offsetting



Emissions Monitoring Plan

Monitoring of CO₂ Emissions – Emissions Monitoring Plan

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- 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 CO₂ 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
 - State to approve the EMP
- The State and aeroplane operator should maintain clear and open communication during development and review of an EMP

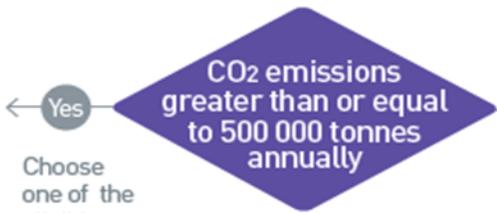
Emissions Monitoring Options

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 CO₂ emissions for operators with low level of activity, ICAO has developed the CORSIA CO₂ 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
CO₂ 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**

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FUEL USE MONITORING METHODS

Method A

Method B

Block-off / Block-on

Fuel Uplift

Fuel Allocation with Block Hour

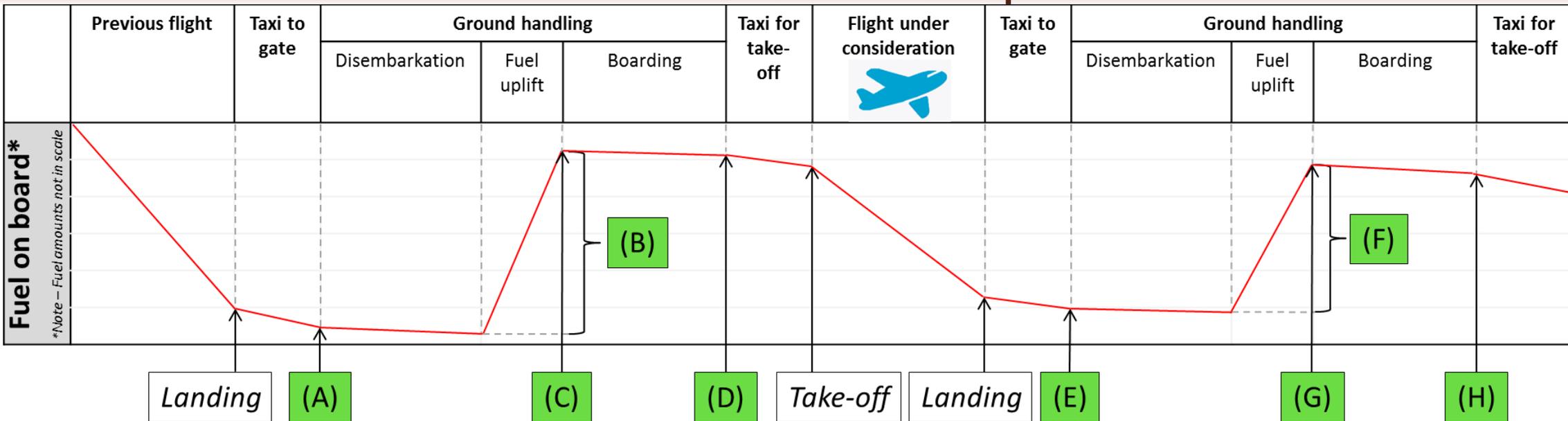
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Fuel use monitoring methods:

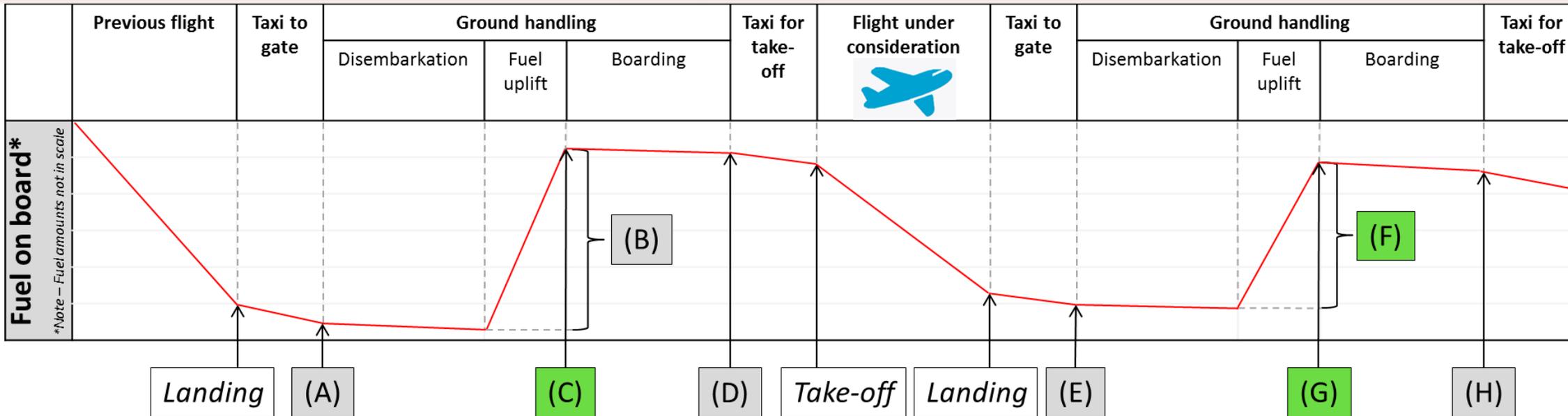
Fuel measurement points



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



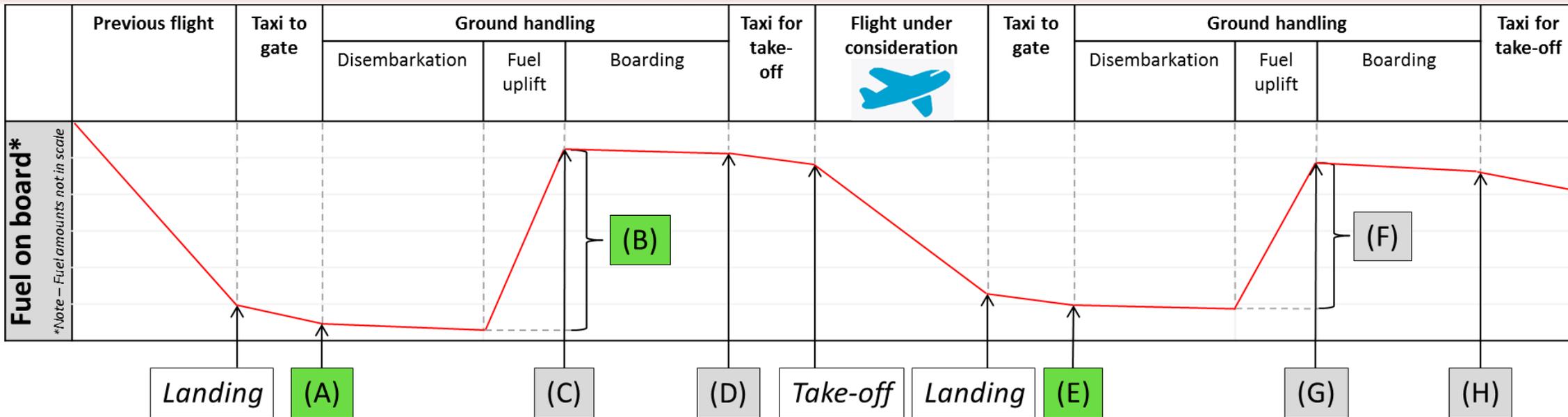
Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring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

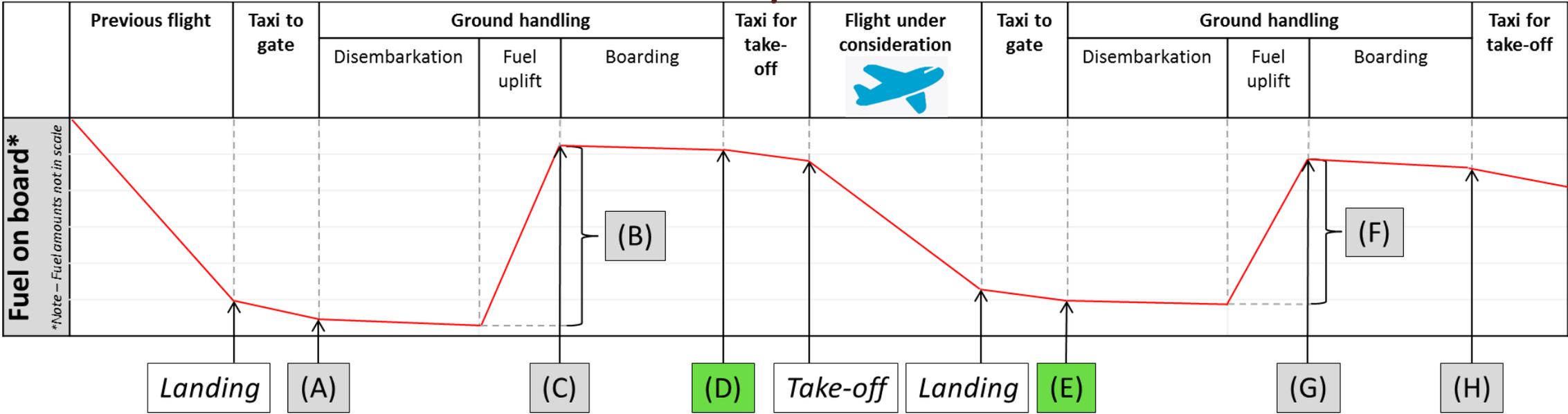


Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring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

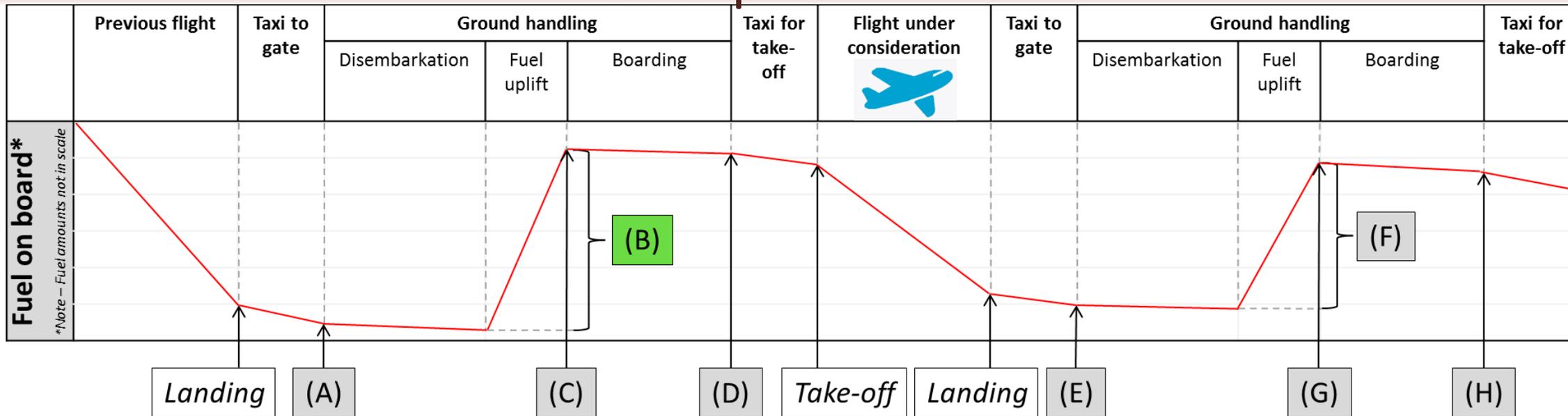


Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring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



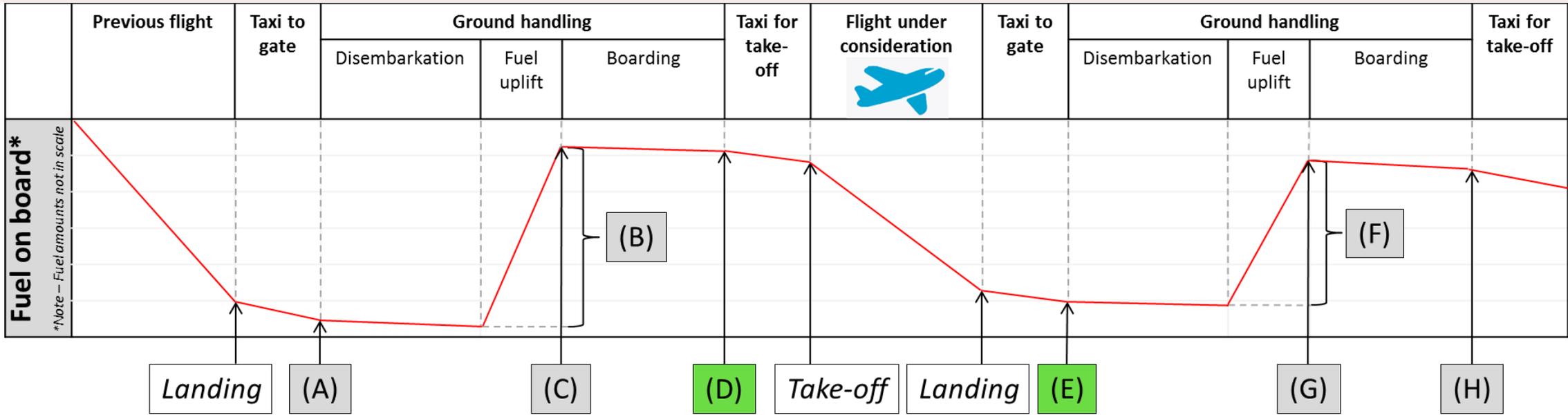
Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Fuel at block-on
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Fuel at block-off	(H) Fuel at block-off
Fuel Use Monitoring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



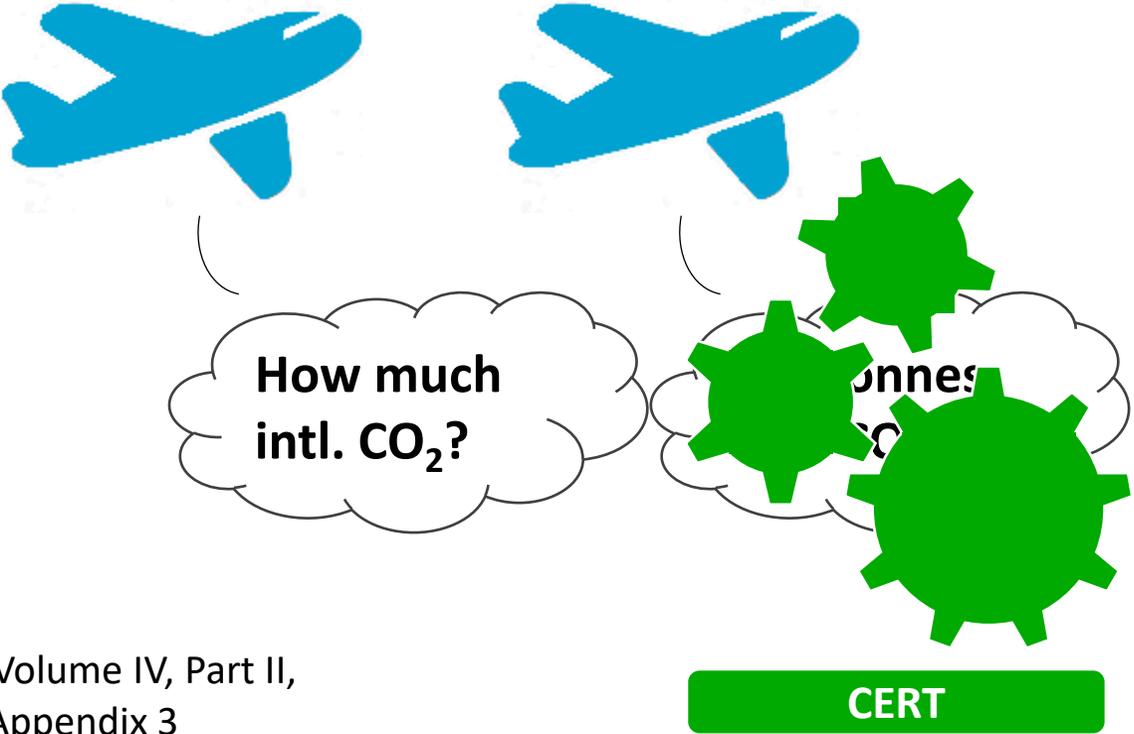
Fuel Measurement Points	
Before the flight under consideration	After the flight under consideration
(A) Fuel at block-on	(E) Block-on time
(B) Fuel uplift	(F) Fuel uplift
(C) Fuel in tanks after fuel uplift	(G) Fuel in tanks after fuel uplift
(D) Block-off time	(H) Fuel at block-off
Fuel Use Monitoring 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 CO2 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?

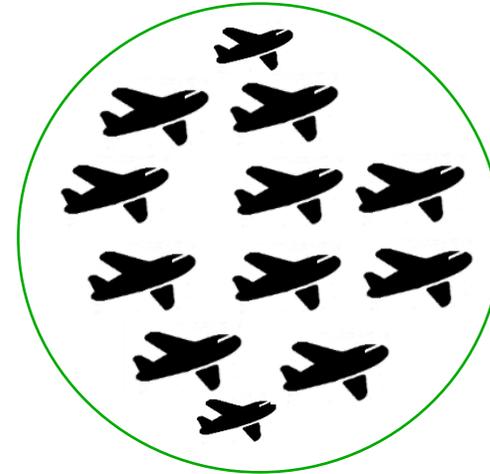
ALL aeroplane operators can use the CERT for a preliminary CO₂ assessment...



Small operators



Medium operators



Large operators



... but only some aeroplane operators can use the CERT as primary* means for CO₂ 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 CO₂ emissions from international flights.

The CERT has up to 4 functionalities:

CERT CO ₂ estimation & reporting tool			
Year of validity	2018 (Version 2018)	2019-2020 (Version 2019-2020)	2021-2035 (Version 2021-2035)
Estimation of CO ₂ for determination of simplified compliance procedures eligibility	Yes	Yes	Yes
Report generation functionality	Partial*	Yes	Yes
Monitoring (estimating CO ₂)	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 CO₂ emissions. The report can be used as supporting evidence for the operator's Emissions Monitoring Plan.



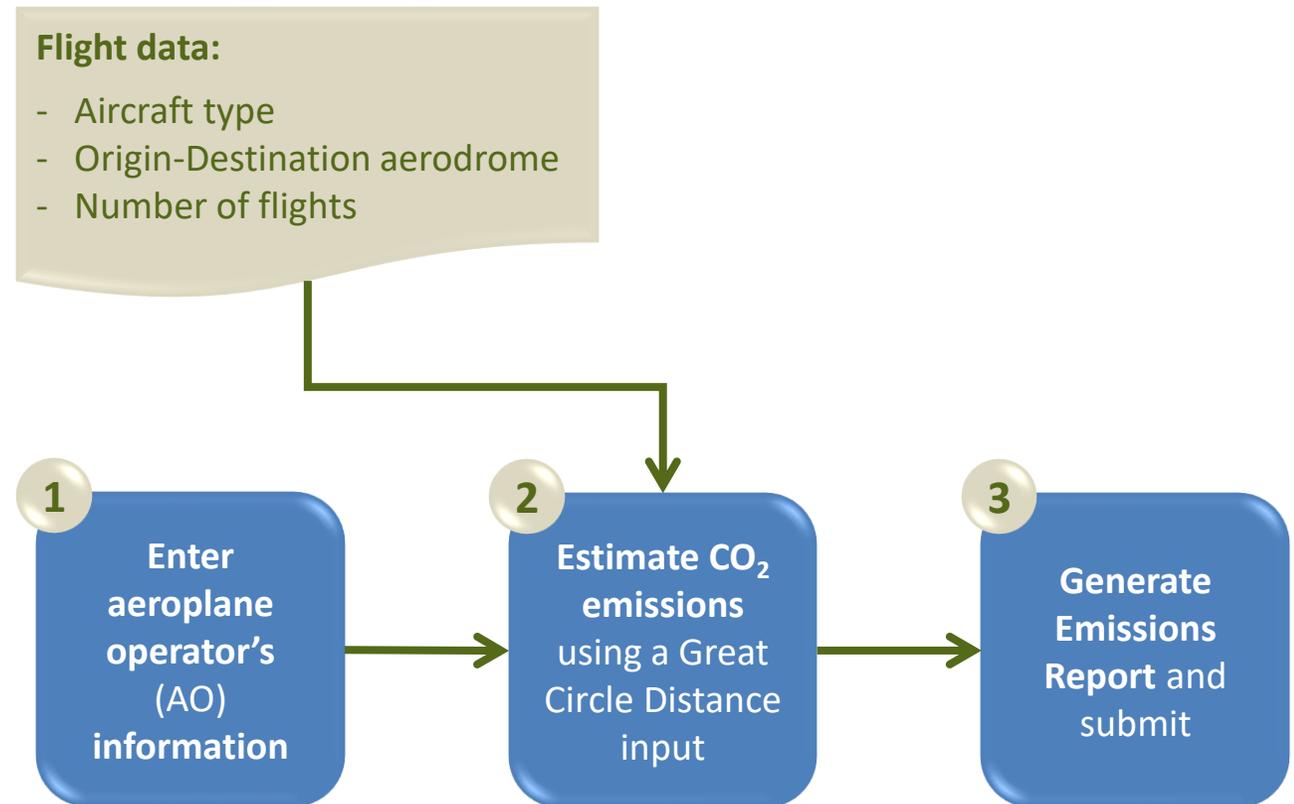
The CERT comprises a three-step process

(1) Entering aeroplane operator's basic information

(2) Entering flight data to estimate CO₂ 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 CO₂ 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 CO₂ Estimation and Reporting Tool (CERT)

- Version 2022 of the ICAO CORSIA CERT is available for download via the CORSIA webpage: www.icao.int/corsia
- In addition, the document *ICAO CORSIA CO₂ Estimation and Reporting Tool (CERT): Design, Development and Validation*, containing the technical methodologies of the ICAO CORSIA CERT, is available for download via the CORSIA webpage: www.icao.int/corsia
- Demonstration of the CERT:

[ICAO CORSIA CO₂ 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 CO₂ 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
- 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

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- 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 CO₂ 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 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.	Can be material – If legal entity or means to identify legal entity changes; resubmit and subject to re-approval.
Name and address.	Can be material – 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 material ; 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.	Not material unless a change in corporate structure changed which entity is the aeroplane operator subject to requirements from Annex 16, Volume IV – 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>Not material – 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; resubmit 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>Can be material – if the aeroplane operator changes the procedures, that would be subject to re-review and re-approval 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>Can be material – 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>Can be material – 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>Not material.</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	Operator: Resubmit the EMP to State State: Review and re-approve the EMP
No	Operator: Notify the changes to the State as a part of the annual Emissions Report State: Receive and take note of the changes

FAQs regarding the EMP and Monitoring of CO₂ Emissions

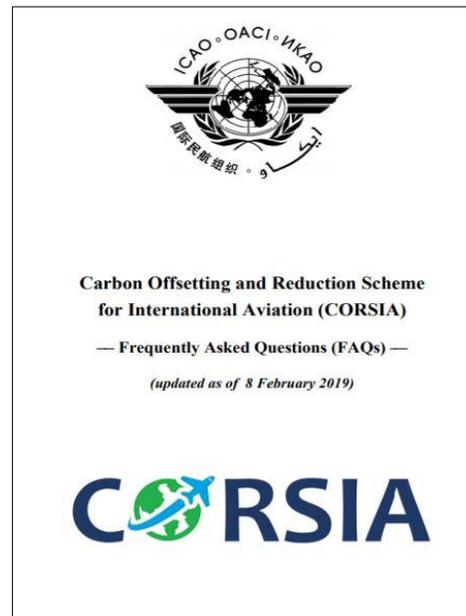
A selection of Frequently Asked Questions (FAQs) on CORSIA and related responses are available for download via the CORSIA webpage: www.icao.int/corsia

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 CO₂ Emissions and Monitoring of CORSIA Eligible Fuels

- After an aeroplane operator monitors its fuel use in accordance with an approved EMP, it shall calculate CO₂ emissions from the fuel burn
- ICAO CORSIA CERT automatically estimates the CO₂ emissions for aeroplane operators who have been approved to use the CERT
- An operator using a Fuel Use Monitoring Method shall determine the CO₂ emissions by using the following equation:

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

Calculation of CO₂ Emissions from Fuel Use

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

Fuel Use

Calculate CO₂ emissions
.....
Fuel Conversion Factor
= 3.16 kg CO₂/kg fuel (Jet-A fuel)
and
= 3.10 kg CO₂/kg fuel (AvGas or Jet-B fuel)

Monitored and reported
CO₂ emissions from
international flights

Note – For the purpose of calculating CO₂ emissions the mass of fuel used includes **all aviation fuels**.

Information on CO₂ 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 CO₂ 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 CO₂ offsetting requirements



Questions?

Exercise 1: EMP

Checklist to Review an EMP

Instructions for Exercise 1

- Two documents are provided for this exercise:
 - Version #2 of an Emissions Monitoring Plan from A1 Airlines (*document 2_2_EMP Material Change Exercise.xlsx*)
 - Emissions Monitoring Plan Checklist from the Environmental Technical Manual, Volume IV (*document 2_2_ETM EMP Checklist.docx*)
- By using the Emissions Monitoring Plan, and the Checklist, your task is to identify material and non-material changes in the Emissions Monitoring Plan.
 - Also, identify appropriate follow-up actions for the material and non-material changes
- 20 minutes to complete the exercise



Thank You