

## EU-South East Asia Aviation Partnership project

### Verification of Aeroplane Operator Reports under CORSIA

*EU-South East Asia Aviation Partnership Project (EU-SEA APP)  
This project is funded by the European Union and implemented  
by the European Union Aviation Safety Agency - EASA*

**Your safety is our mission.**

An Agency of the European Union 

## CORSIA Activities Requiring Verification

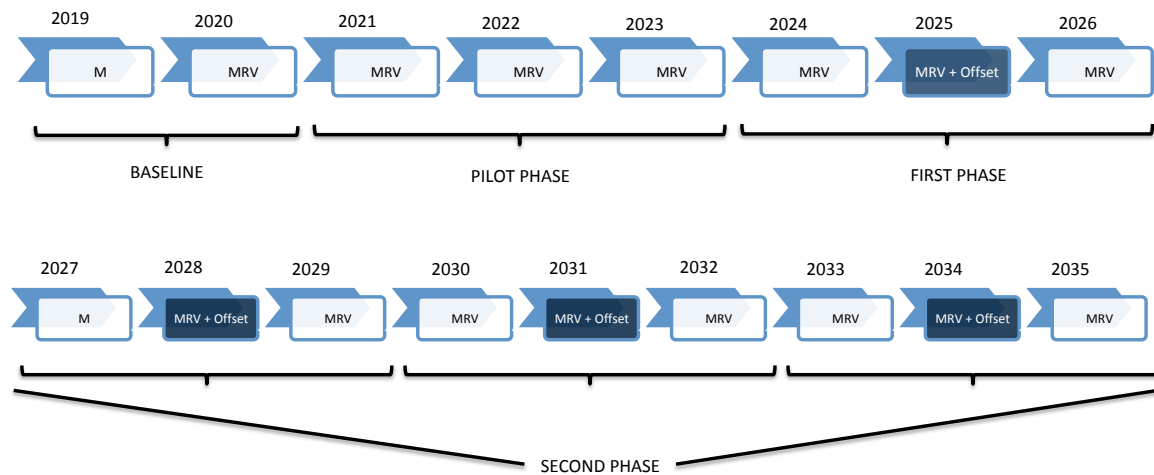
→ CORSIA sets up two kind of key obligations, with different timetables

Emissions MR  
From 2019

Offsetting  
from 2021

→ Both Obligations will require Verification

## MRV and Offsetting Obligations



## Verification → Terminology



### Emissions Report:

- Document that includes all relevant emissions-related data, produced by the operator, verified by the verifier



### Verification report

- A document, drafted by the verification body, containing the verification statement, the required supporting information and all the findings of the verification.



### Verification body

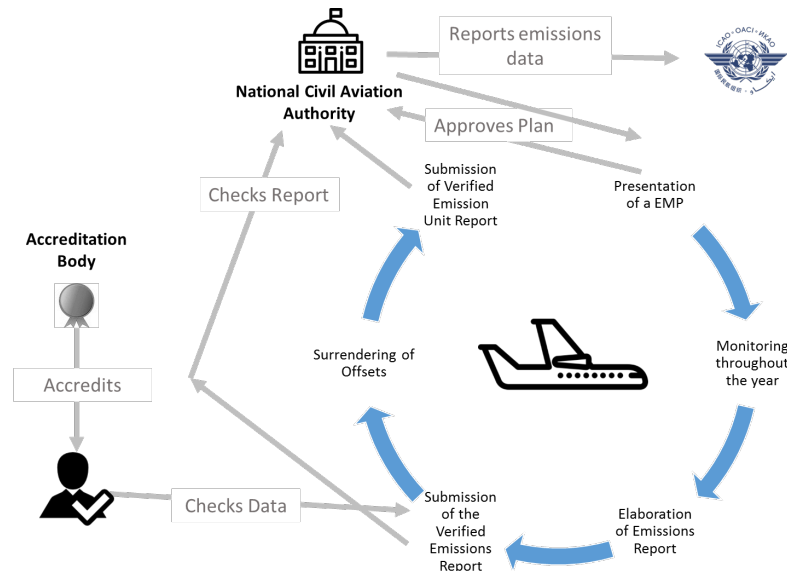
- A legal entity that performs the verification of an Emissions Report and, when required, an Emissions Units Cancellation Report, as an accredited independent third party.



### Verification Team

- A group of verifiers, or a single verifier that also qualifies as team leader, belonging to a verification body conducting the verification of an Emissions Report and, when required, an Emissions Units Cancellation Report. The team can be supported by external experts.

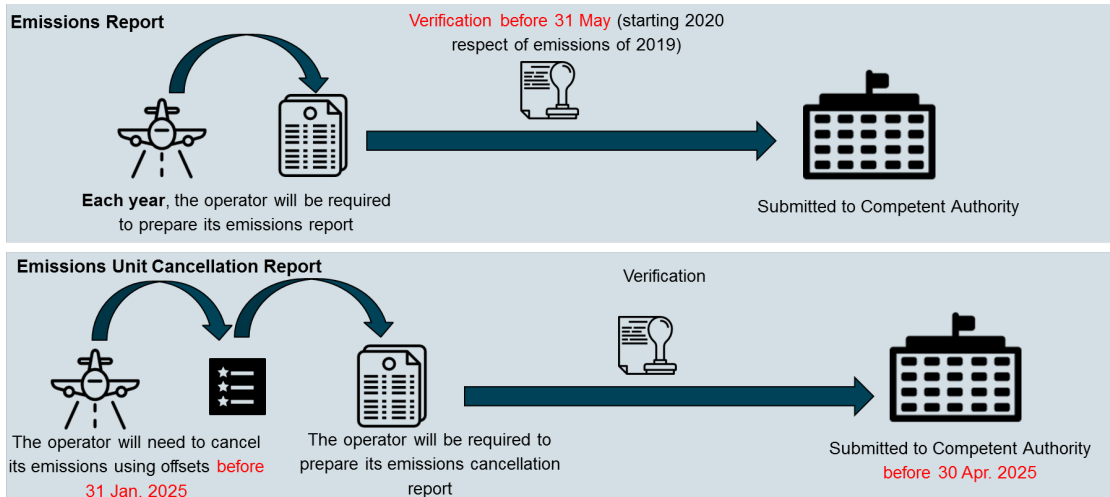
## Verification in the Compliance Cycle



## Identification of Eligible Verification Bodies

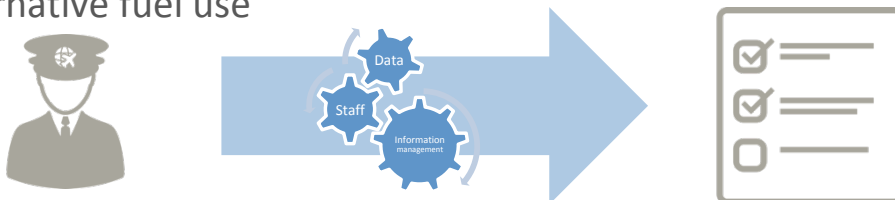
- Each State is required to submit to ICAO a list of nationally-accredited verification bodies.
- ICAO to make it available in the "CORSIA Central Registry (CCR): Information and Data for Transparency"

## Verification: Why? How?



## Purpose of Emissions Report Verification

- To ensure that the data is accurate and free of errors
- To ensure that reporting procedures have been applied correctly
- To check accuracy of emissions reductions claimed from alternative fuel use



It involves understanding the data transformation process

## Purpose of the Emissions Cancellation Report Verification

- Ensure the purchase of the emissions units equivalent to the offsetting obligations given by the Competent Authority
- Ensure that these units come from eligible programmes
- Ensure that the units have been duly cancelled
- Confirm the single use of the units

Note: CAEP is working to provide guidance on the verification of Emission Units Cancellation Report to be included in a future revision of the ETM (Doc. 9501), Volume IV

## Emissions Units - Status



ICAO document

CORSIA Emissions Unit Eligibility Criteria



March 2019

**CORSIA**  
Carbon Offsetting and Reduction Scheme for International Aviation

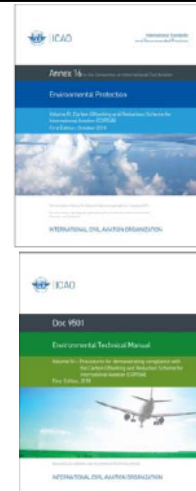
→ Eligibility criteria approved by ICAO Council in March 2019

→ TAB to assess programmes and recommend on a list of eligible units

→ First recommendations expected by March 2020

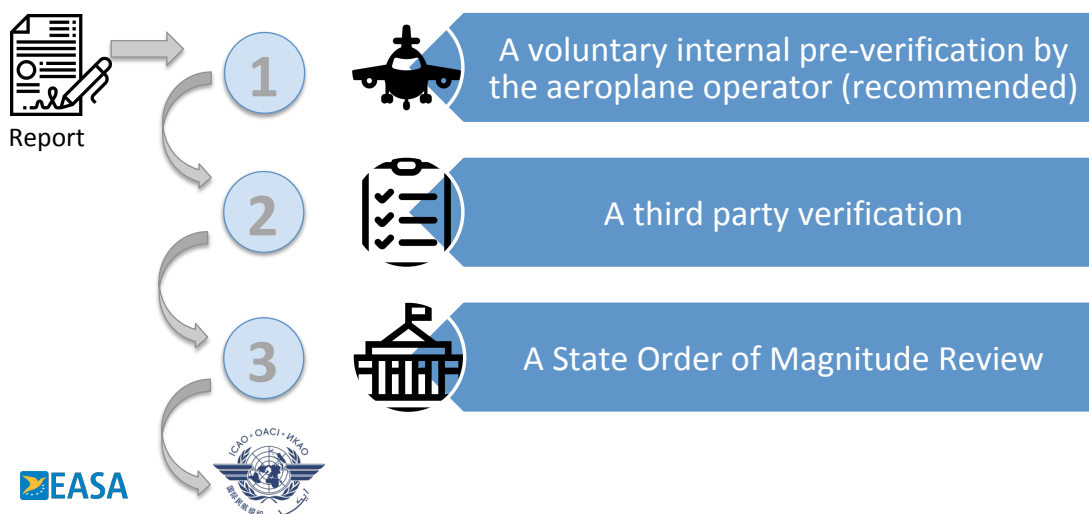
## Main Reference documents

- ICAO SARPS → Annex 16- Environmental protection, Volume IV: CORSIA
  - Part II, Chapter 2, 2.4; Chapter 4, 4.4; and Appendix 6
- ICAO Guidance: Environmental Technical Manual (ETM), Volume IV (Doc 9501); CORSIA
  - Chapter 3, 3.3
- ISO Standards
  - **ISO 14064-3:2006**: "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions."
  - **ISO 14065:2013** "Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition."
  - **ISO/IEC 17011:2004** "Conformity assessment – General requirements for accreditation bodies accrediting conformity assessment bodies".

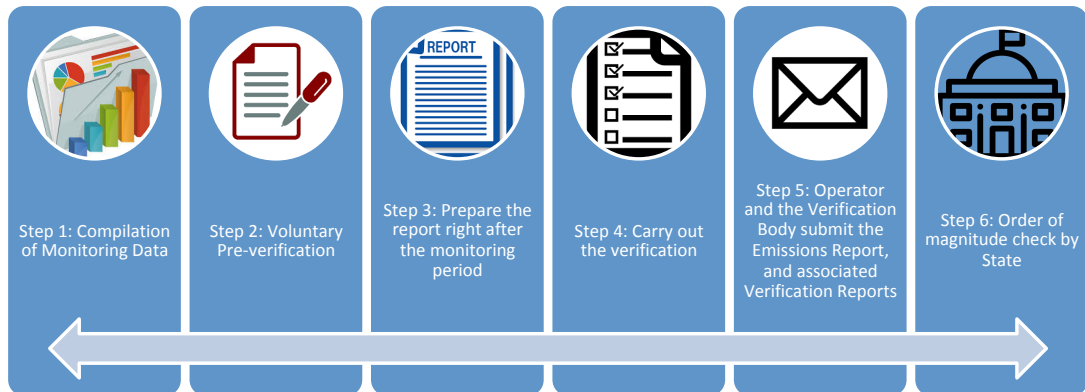


## Three Step Verification Pathway

- CORSIA foresees a three-step verification pathway:



## Integrating Verification in Reporting Procedure- Aeroplane Operator's Perspective



## Importance of the Internal Pre-verification

- Ensure quality control of data gathering process and calculation systems and ensure the data passes logic checks in advance of the verifier coming on site. Benefits:
  - Allows to identify procedural irregularities and take corrective action
  - Helps reducing Data Gaps (Note that they can't go above a 5% threshold)
  - Allows to save time in the third party verification and may reduce its cost
- Team managing day-to-day MRV needs to select an internal auditor
- Outcomes:
  - CORSIA day-to-day management team will be required to evaluate the list of findings
  - Execute corrective actions to prepare for third- party verification



## Importance of the Internal Pre-verification

### → Requirements of the internal auditor

Understanding of the MR Process	Identification of Scope	Evaluate the Staff Competence	Identify Errors or Logic Gaps
<ul style="list-style-type: none"> <li>Revision of the plan &amp; other procedures, data flow charts, preliminary Draft of Emissions report versions, historical reports, communication with State</li> </ul>	<ul style="list-style-type: none"> <li>Development of data sampling plan based on the identification of risks</li> <li>Check data sources (in line with plan)</li> <li>If data flow diagram exists, compare with actual process</li> </ul>	<ul style="list-style-type: none"> <li>Interview staff</li> <li>Ensure that CORSIA management team have adequate knowledge</li> <li>Check if the responsibilities assigned to staff have been completed</li> </ul>	<ul style="list-style-type: none"> <li>Confirm calculations and totalized values</li> <li>Compare data with previous years</li> <li>Error checking routines</li> <li>Compare expected estimates with actual fuel burn</li> </ul>







Develop a data sampling plan based on documentation analysis

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## Importance of the Internal Pre-verification

### → For such, the CORSIA management team previously has:

1. Defined all the procedures/manuals 
2. Nominated a Responsible Person in the Company/Contact Point 
3. Engaged & educated all the departments that will be involved in the process:
  - Fuel Management (fuel consumption control)
  - IT (for data management/extraction of reports and information/information back-up)
  - Quality Management
  - Financial Department
  - Maintenance
4. Prepared/adapted data management system/IT Tools for emissions reporting:
  - Create automatized reports if the IT Tool is adapted



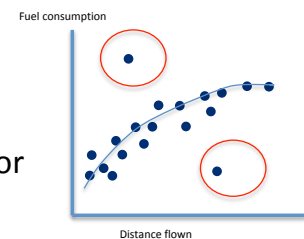
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## Importance of the Internal Pre-verification

→ Examples of analysis to identify errors or logic gaps:

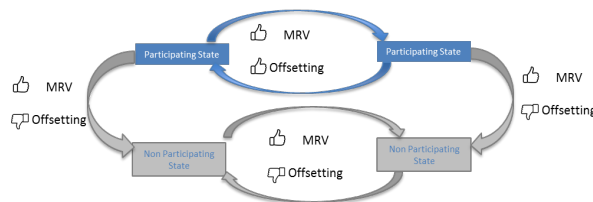
- Comparison with previous years and previous activities (statistical consumption analysis for aerodrome pair, plotting consumptions on a graph and checking outliers)
- Adequacy of error checking routines (in line with financial checks)
- Check completeness of flights
- Match between aerodrome of arrival and departure for next flight



## Importance of the Internal Pre-verification

→ Examples of analysis to assess scope and technical exemptions:

- Check that flights with offsetting requirements are correctly identified



- Check if exempted flights are recorded correctly

- Military and State Flights
- Medical
- Humanitarian
- Firefighting

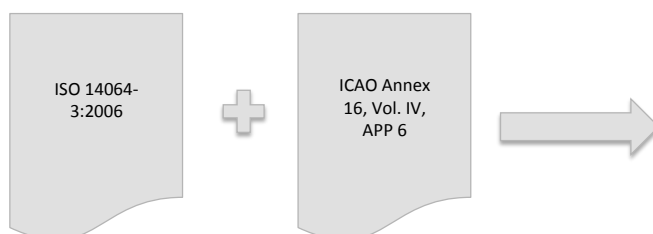
Can be crosschecked with item 18 or 8 of flight plan

## Importance of the Internal Pre-verification

- The operator decides how to conduct the internal pre-verification
- Will very much depend on the risks identified
- Guidelines for internal pre-verification provided in ETM (Doc 9501), Volume IV, 3.3.4.1 and Table 3-8
- Verifier can lower the risk assigned to the operator if this procedure is in place there is proof of it

## Third Party Verification

- Once the emissions report is ready, the operator shall engage an accredited verification body
- Verification will be conducted against:



### Current situation on availability of Verification Bodies:

Verification bodies with ISO 14064-3:2006 background will need to upgrade their knowledge with ICAO Annex 16 to obtain accreditation

## The Verification Bodies: Requirements for Accreditation



Evaluated by  
National  
Accreditation  
Body (NAB)



- Verification Bodies must be accredited to ISO 14065:2013 for a technical scope relevant to aviation.
- In order to satisfy Accreditation Requirements:
  - Avoidance of Conflict of Interest; Maximum number of annual verifications: 6 for team leader, 3 year break afterwards
  - Evaluate the competence of personnel
  - Ensure the adequate competence of the verification team
  - Demonstrate detailed knowledge of ISO 14064 & previous auditing experience, SARPs & ETM
  - Confidentiality: establish mechanism for consent to submit emissions report (in contract)
  - Record Keeping: minimum of 10 years

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## Accreditation: The NAB

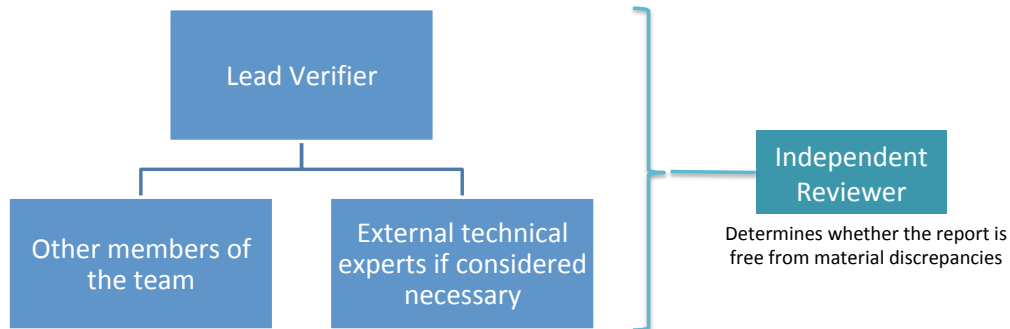
- Will check if all the requirements are accomplished by the verifier, operating in accordance with the international standard ISO/IEC 17011:2004 "Conformity Assessment – General requirements for accreditation bodies accrediting conformity assessment bodies"
- Are evaluated by peers as competent, sign arrangements to enhance the acceptance of their services across national borders



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## The Verification Bodies: Requirements for Accreditation

### → Verification Team



Number of members composing the team usually decided depending on several factors like experience, risk assessment, size of the operator...



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## The Verification Bodies: Specific Aviation Knowledge

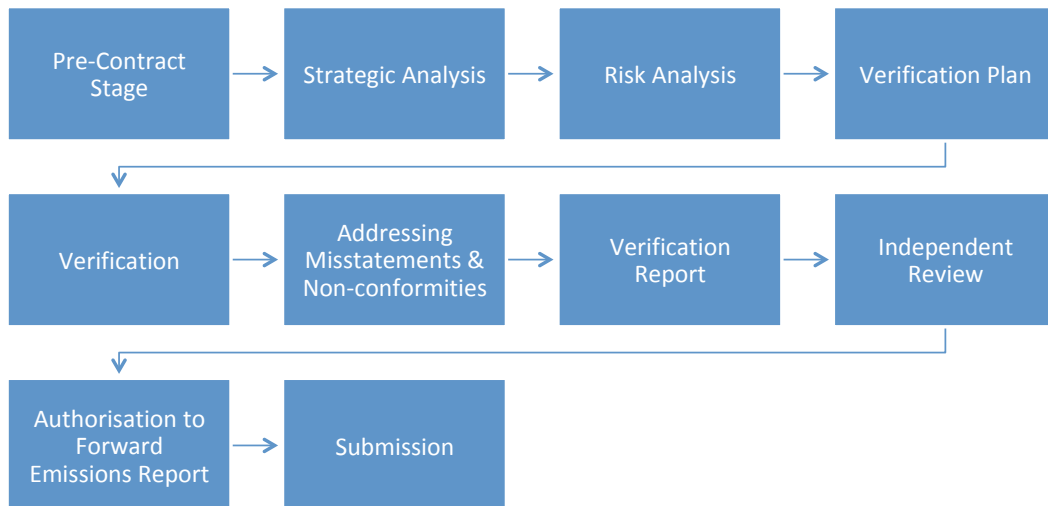
### → Verification team must demonstrate knowledge on:

- General technical processes in the field of civil aviation
- Aviation fuels and their characteristics, including CORSIA eligible fuels
- Fuel related processes including flight planning & calculation
- Aviation trends or situations that may impact CO<sub>2</sub> emissions estimate
- CO<sub>2</sub> emissions quantification methodologies
- Fuel measurement devices and related procedures for monitoring of fuel use
- GHG gas information and data management systems & controls
- Aviation related IT systems (flight planning software or operational management systems)
- CORSIA approved Sustainability Certification schemes relevant for eligible fuels
- GHG markets and emissions units programme registries



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## Steps of the Verification Process



## Verification Contract

- Verification Contract with operator should include
- Scope, level of assurance, materiality thresholds and relevant verification standards (ISO 14065 & ISO 14064-3, SARPs & ETM)
  - Time allocated for verification
  - Flexibility to change time allocation if necessary
  - Conditions in terms of access to documentation, personnel & premises
  - Requirement to accept the audit as a potential witness audit by NAB
  - Requirement of the operator to release the emissions report to the State
  - Liability coverage



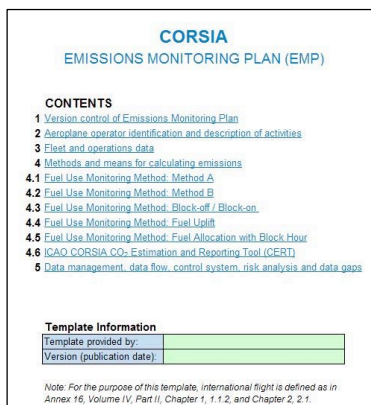
## Planning the Verification

→ The Verification team should plan the verification based on the strategic analysis and a risk assessment approach.

The plan must include:

- Team members, roles responsibilities
- Any external resources required
- Schedule
- Sampling plan

## Planning the Verification: EMP



→ The Emissions Monitoring Plan (EMP) is always the starting point of the verification:

- Has the EMP been approved by the Competent Authority?
- Does the EMP meet the requirements of Annex 16, Volume IV & national legislation?
- Has the Emissions Report been drafted in accordance with the latest version of the approved EMP?

## Primary data sources for emissions reporting

- Verifier must cross-check the values used for final emissions calculations are true and free of errors, in order to ensure there are no misstatements and non-conformities
- Sampling technique and method based in the results of the risk analysis
- Sampling needs to be representative of the overall population
- Table 3-10 of ETM gives examples of aviation reference data sources and documentation

## Monitoring Methods Under CORSIA

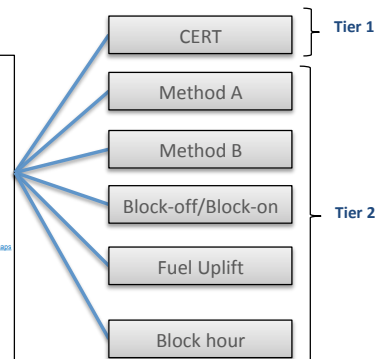
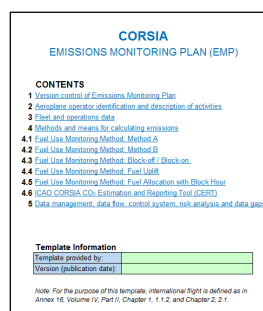
$$\text{CO}_2 \text{ Emissions} = \text{MF} * \text{EF}$$

Where:

*MF* = Mass of fuel used

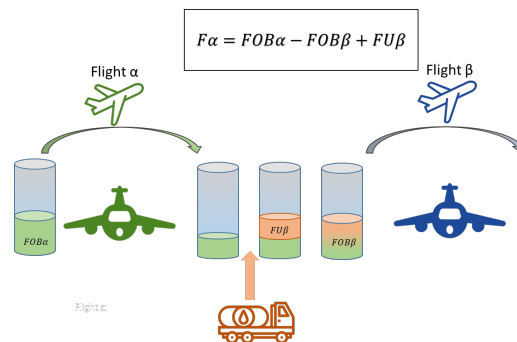
*EF* = Emissions Factor

Constant emission factor  
for Jet A1: 3.16



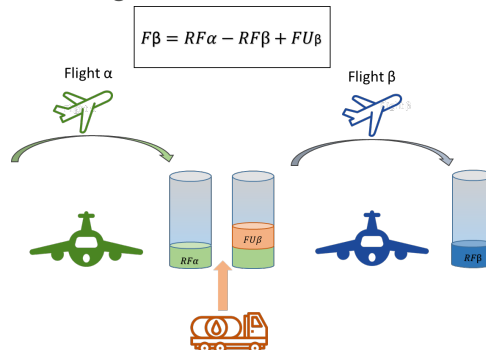
## Method A

- Relates the flight for which the calculation is carried out to the subsequent flight. Data needed:
  - Data of the fuel on board (FOB) once uplift is completed of the flight under consideration
  - Data of FOB once uplift is completed of the subsequent flight
  - Fuel Uplift of the subsequent flight



## Method B

- Relates the flight for which the calculation is carried out to the previous flight . Data needed:
  - Remaining fuel at tanks for the flight in question (amount in the tanks at block-on)
  - Remaining fuel at tanks for the previous flight (amount in the tanks at block-on)
  - Fuel Uplift of the flight under consideration





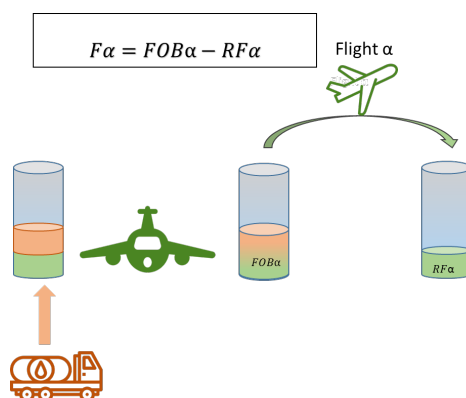
## Methods A & B: Considerations during the Verification

- Larger number of data points → revise if method has been applied correctly
- Large number of data points → these methods can be rather error prone
- These considerations should be taken in the risk analysis
- Verification body to revise if operator's data flow and processes indeed allow for these methods

i.e.: Data of FOB once uplift is completed of the subsequent flight (note: do not mistake with block-off data)

## Block-off/Block-on

- Only requires data from the flight under consideration. Data needed:
  - FOB of the flight under consideration (amount in the tanks at block-off)
  - Remaining fuel at tanks for the flight under consideration (amount in the tanks at block-on)

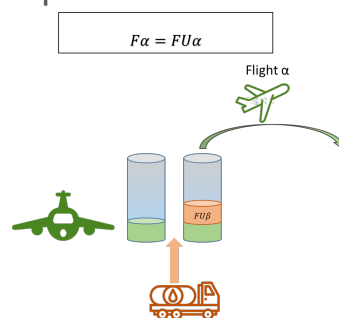


## Block-off/Block-on Method: Considerations during the Verification

- Lower number of data points
- All of them usually available in day to day operations, and all of the information is internal

## Fuel Uplift

- Requires data for the flight under consideration for which the only data point required will be the fuel uplift.



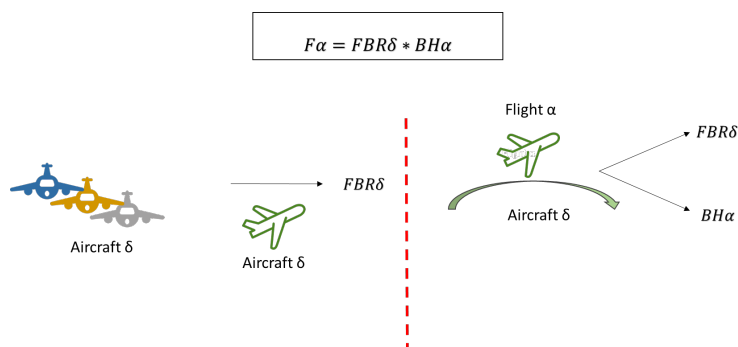
- When no fuel uplift is done in a subsequent flight, the uplift should be distributed proportionally to the block hours

## Fuel Uplift Method: Considerations during the Verification

- Verifier should take attention to the primary data source used.  
Options: Fuel slip & measured uplift
- Verifier should make use of accounting information
- Verifier to evaluate if distribution of uplifts in case of flights without uplift is correctly applied

## Block Hour

- Method based on statistical data of fuel burn
  - Aircraft operator to create an average fuel burn ratio (FBR) per airplane used
  - Average FBR calculated by using data of fuel uplifts from the actual reporting year
  - FBR can be provided as a generic one or separating domestic and international flights



- Two options may be available:
  - Operators who distinguish between international and domestic uplifts.
  - Operators who don't distinguish between international and domestic

## Block Hour Method: Considerations during the Verification

- Verifier needs to check Average FBR calculation since a small deviation has a large impact on the emissions value. i.e.: this includes checking whether the data used is from the reporting year
- Fuel uplift can be used for crosschecking since it is implicitly included in the method

## CERT Method

### Two input methods to estimate emissions

#### Block Time input method

- ICAO Aircraft Type - Model Designator
- Origin Aerodrome ICAO Designator
- Destination Aerodrome ICAO Designator
- Block Time (in hours)
- Number of Flights
- Date (Optional)
- Flight ID (Optional)

#### Great Circle Distance input method

- ICAO Aircraft Type - Model Designator
- Origin Aerodrome ICAO Designator
- Destination Aerodrome ICAO Designator
- Number of Flights
- Date (Optional)
- Flight ID (Optional)

\*Note: 2 reasons why an operator may use the tool:

- Its emissions are below the established activity thresholds
- Emissions from flights not subject to offsetting

## CERT: Considerations For Verification

- Confirm eligibility for CERT use
  - 2019-2020 period: operators with CO<sub>2</sub> emissions in international flights ≤ **500 000 tones**
  - 2021-2035 period: operators with CO<sub>2</sub> emissions from international flights subject to offsetting requirements ≤ **50 000 tones**
- Evaluate correct input of flights is key

## Checks Undertaken during Verification

Assessment of GHG information systems and controls	<ul style="list-style-type: none"> <li>•Assure the quality of data to avoid bias</li> <li>•Assess control activities compared with requirements of Annex 16, Volume IV, including outsourced processes</li> </ul>
Testing IT controls	<ul style="list-style-type: none"> <li>•Evaluate the risks related to vulnerability, malfunctioning, lack of data flow transparency (black boxes), human error</li> <li>•Check if IT system is managed under a management system</li> <li>•Revise access rights</li> </ul>
Testing of outsourced processes	<ul style="list-style-type: none"> <li>•Check if the operator controls the quality of data provided by third parties (plausibility checks, etc.)</li> </ul>
Fleet & operations revision	<ul style="list-style-type: none"> <li>•Ensure correct identification of all the possible emission sources (for example, crosschecking with AOC)</li> <li>•Crosscheck flights with Air Traffic Control invoices</li> <li>•Revise inclusion of all appropriate international flights, and application of exemptions</li> </ul>
CORSIA eligible fuels	<ul style="list-style-type: none"> <li>•confirm that sustainability documentation provided by the fuel producers through the aeroplane operator is reliable and from CORSIA approved Sustainability Certification Schemes</li> <li>•that the reported batch volumes/mass are correct and in line with the documentation</li> </ul>

## Examples of Data Sources for Verification

Examples	Primary/ Secondary	Internal/ External	
Airline Software systems	2	Internal	Operational data containing details on flights, loads, routing, etc.
Flight/technical logs	1	Internal	Operational data containing details on flights, loads, routing, etc.
ATC flight plan	1	Internal	Operational data needed to operate a flight containing aeroplane identification, flight route details
Air traffic control invoices	1	External	Operational data containing flight details aeroplane routing including speed & altitude
Fuel invoices	1	External	Invoice from fuel supplier that can be used for cross checking uplift with technical logs or software systems
Fuel slips	1	External	Transaction document per flight containing uplift, sometimes density
Maintenance/downtime records	1 & 2	Internal	Contains information on block-off hours, can be used to track effects like emptying tanks or long period of inactivity
Fuel density records	1	External	Density sometimes included in slip
Blend tickets			Information concerning CORSIA eligible fuels located within the fuels associated Certificate of Analysis of Refinery Certificate of Quality
Sustainability documentation		External	Information concerning CORSIA eligible fuels
Wet lease agreements	1	Internal	Can contain relevant information such as provisions on forwarding of fuel and emissions calculations to the lessor
AOC	1	External	Certificate authorizing to carry out specified commercial air transport operations that usually includes fleet
Flight plan	1	Internal	Contains airplane identification & route details, it is a planning document and does not provide evidence that flight was carried out



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## Misstatements & Non-Conformities

**Misstatement:** error, omission or misrepresentation in the operator's emissions report

- Missing flights
- Non addressed data gaps
- Implausible data.

**Non-Conformity:** any act or omission not in accordance with the requirements in the approved plan

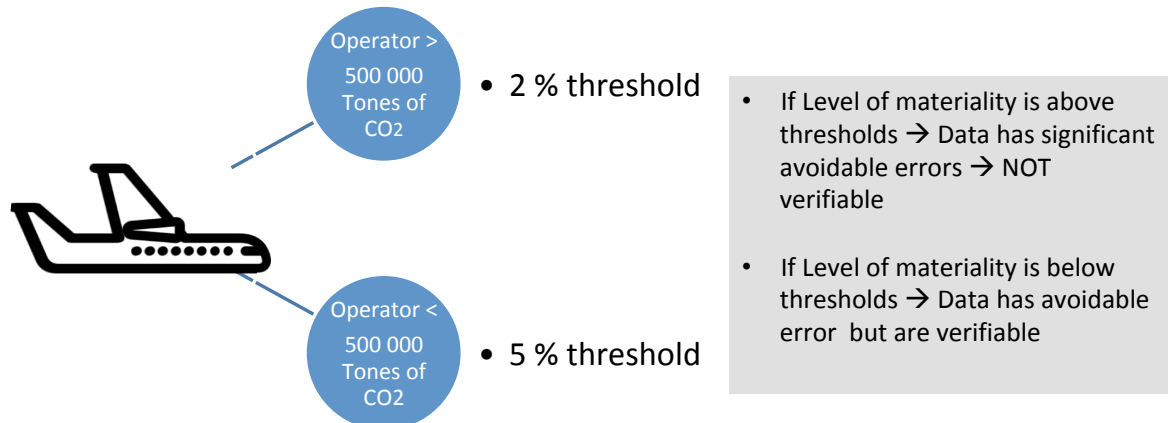
- Incorrect application of method
- Incorrect use of CERT
- Incorrect version of plan used
- Quality procedures not respected



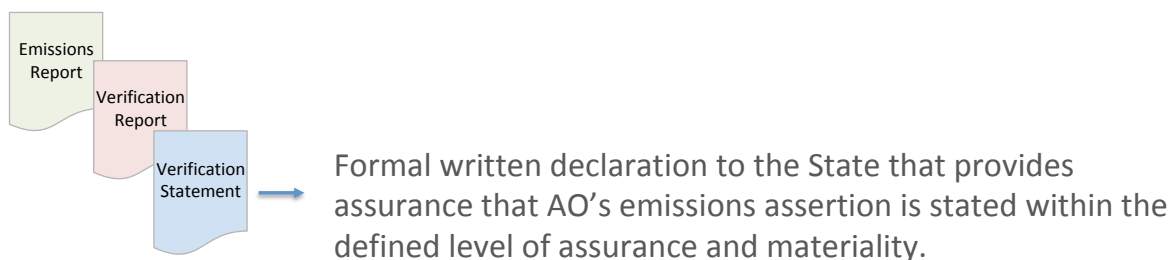
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## Materiality Thresholds

→ Materiality: referring to the amount of tolerable misstatements/non-conformities affecting the final emissions value



## Resulting documents for submission



Verified as Satisfactory

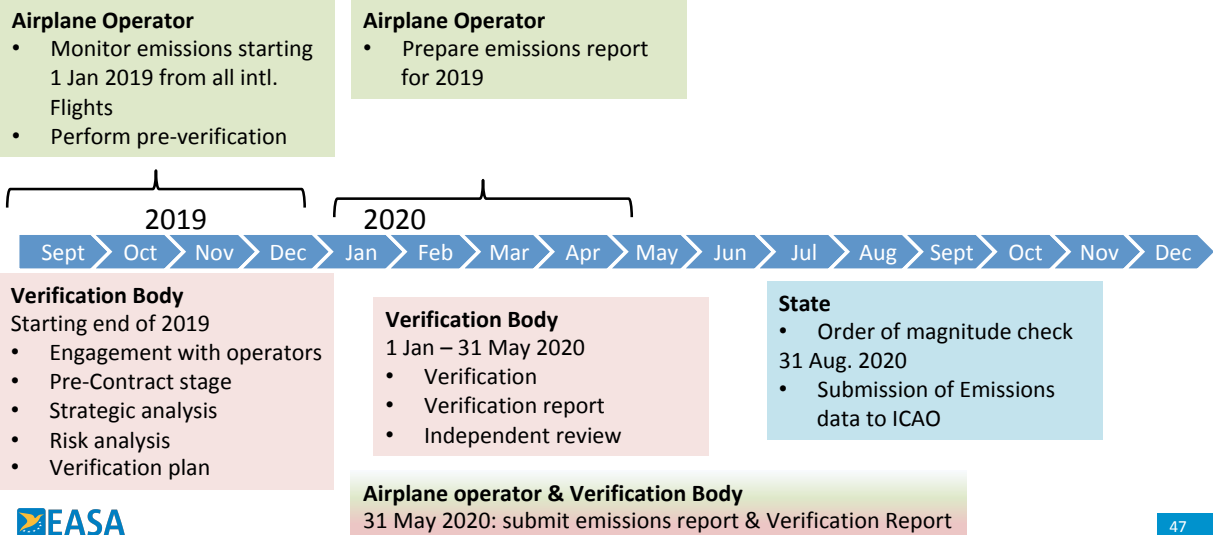


Verified with comments → when report has non-material misstatement and/or non-conformities



Verified as non satisfactory → if material misstatement and/or non-conformities or if scope of verification is too limited

## Short Term Timeline



Thank you!