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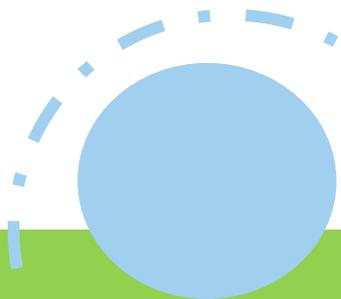
# Verification of CO<sub>2</sub> Emissions

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***ICAO/SASO ENV Workshop***

***Mbabane, Eswatini (24-27 Oct 2023)***

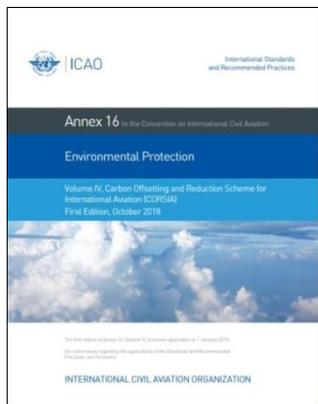
Ms. Chinga Mazhetese  
*Regional Officer: Environment/ Meteorology*  
*ICAO ESAF Office*





- This presentation will:
  - Provide an overview of the CORSIA verification process for CO<sub>2</sub> emissions
  - Demonstration of the Verification Report template

## ICAO Standards and Recommended Practices (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.

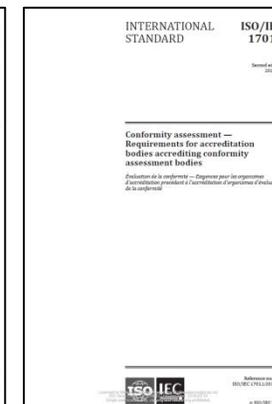
## ISO Standards



- **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”.



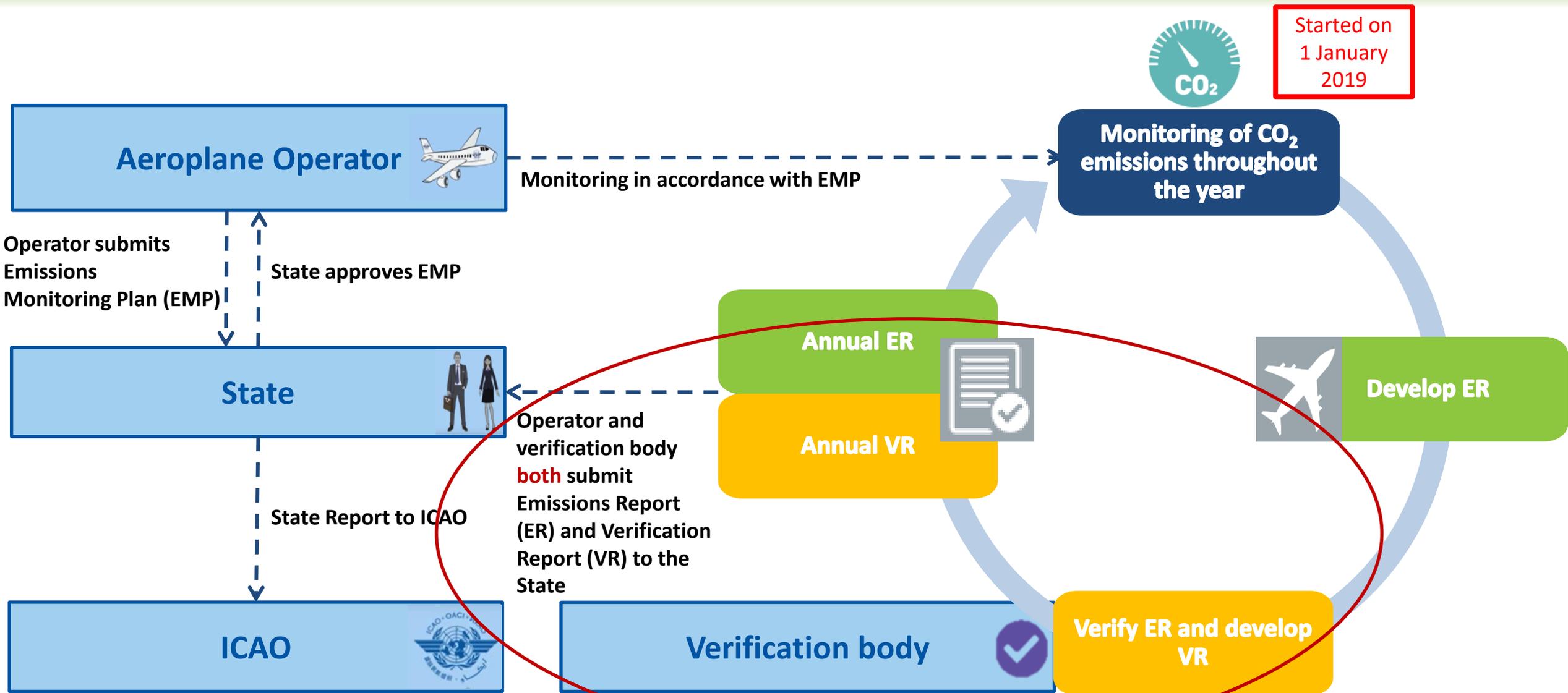
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# Verification Process

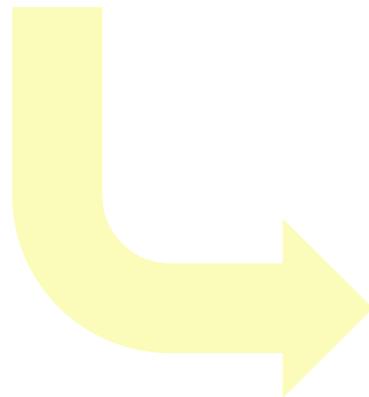
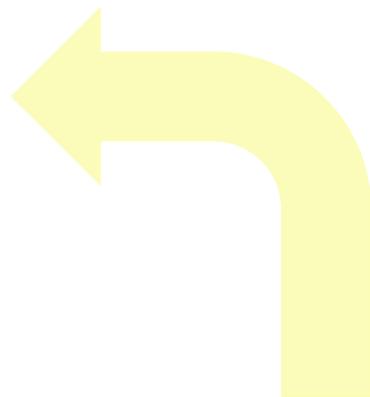
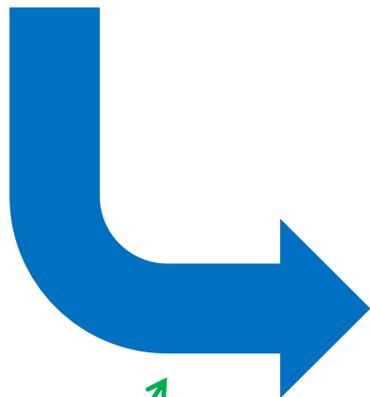


# Annual Cycle for MRV Activities



- A process to ensure that the information is accurate without errors prior to an aeroplane operator's reporting to State
- Requires an independent third-party
- Already in use in various forms (financial auditing, greenhouse gas inventories, emissions reduction projects etc.)

# Verification Information Flow

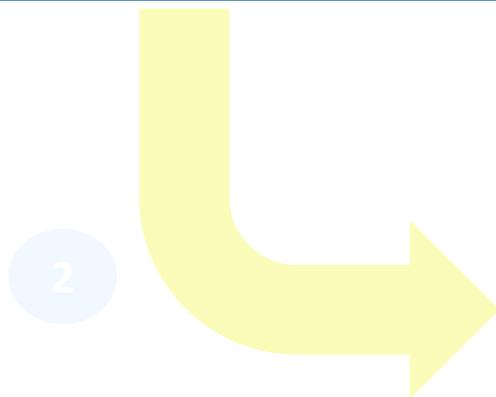
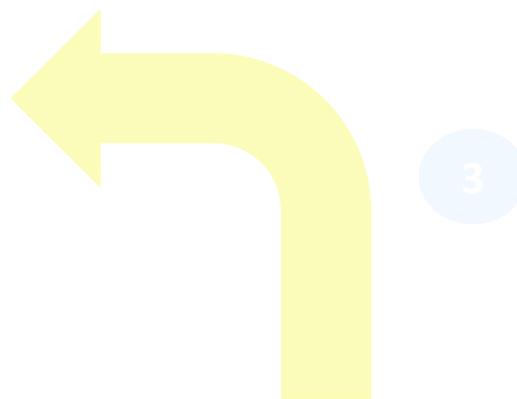


Aeroplane operator reports to State through the annual Emissions Report



The annual Emissions Report is a document subject to a verification procedure

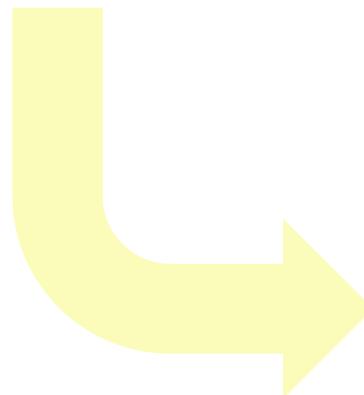
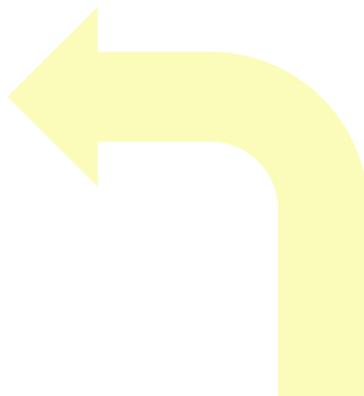




**1** Internal pre-verification

Internal pre-verification is a recommendation and not a requirement

# Verification Information Flow



Internal pre-verification

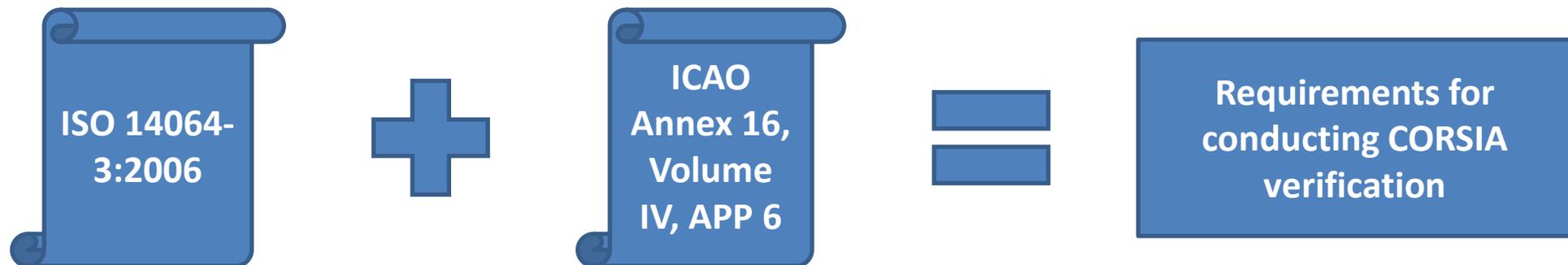


Aeroplane operator submits Emissions Report to an accredited verification body

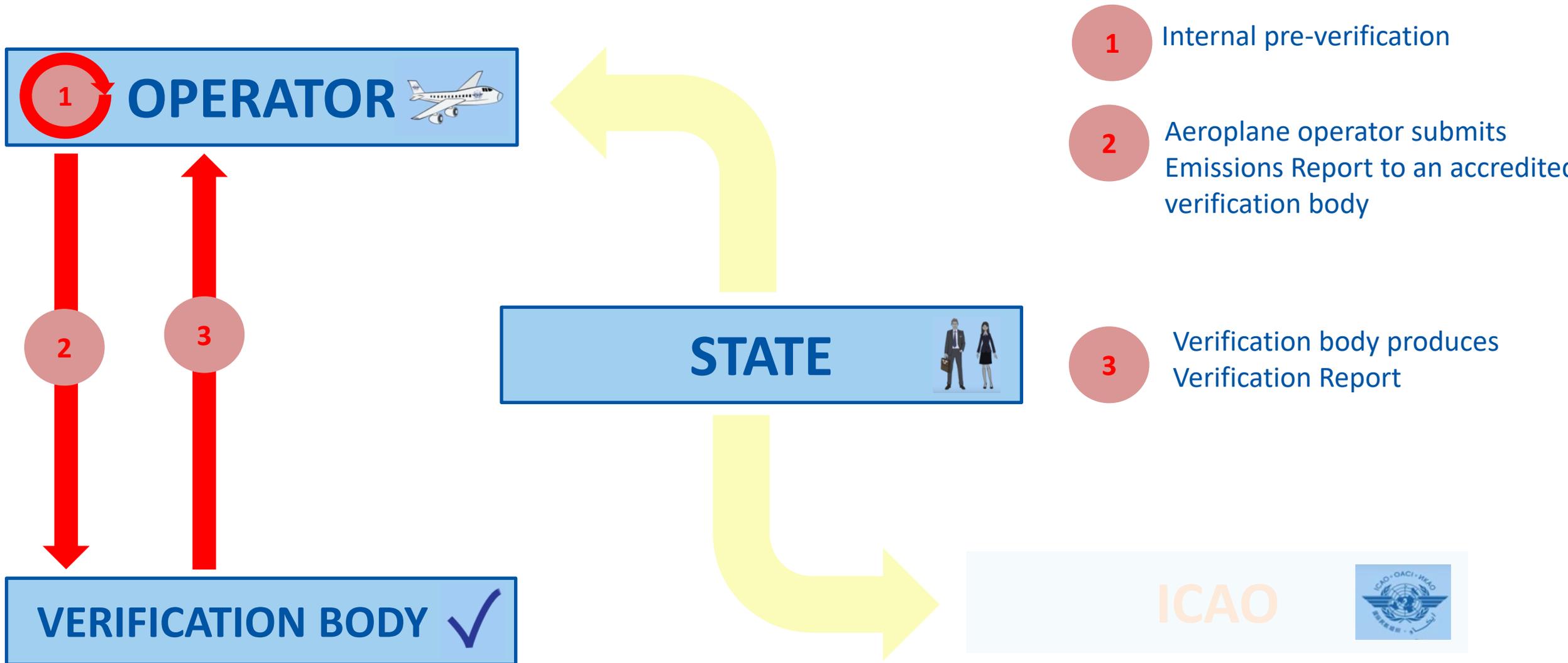


## Verification by the Verification Body

- The aeroplane operator shall engage an accredited verification body for the verification of its annual Emissions Report
- A verification body shall conduct the verification according to ISO 14064-3:2006, and the CORSIA-specific requirements described in Annex 16, Volume IV, Appendix 6



# Verification Information Flow

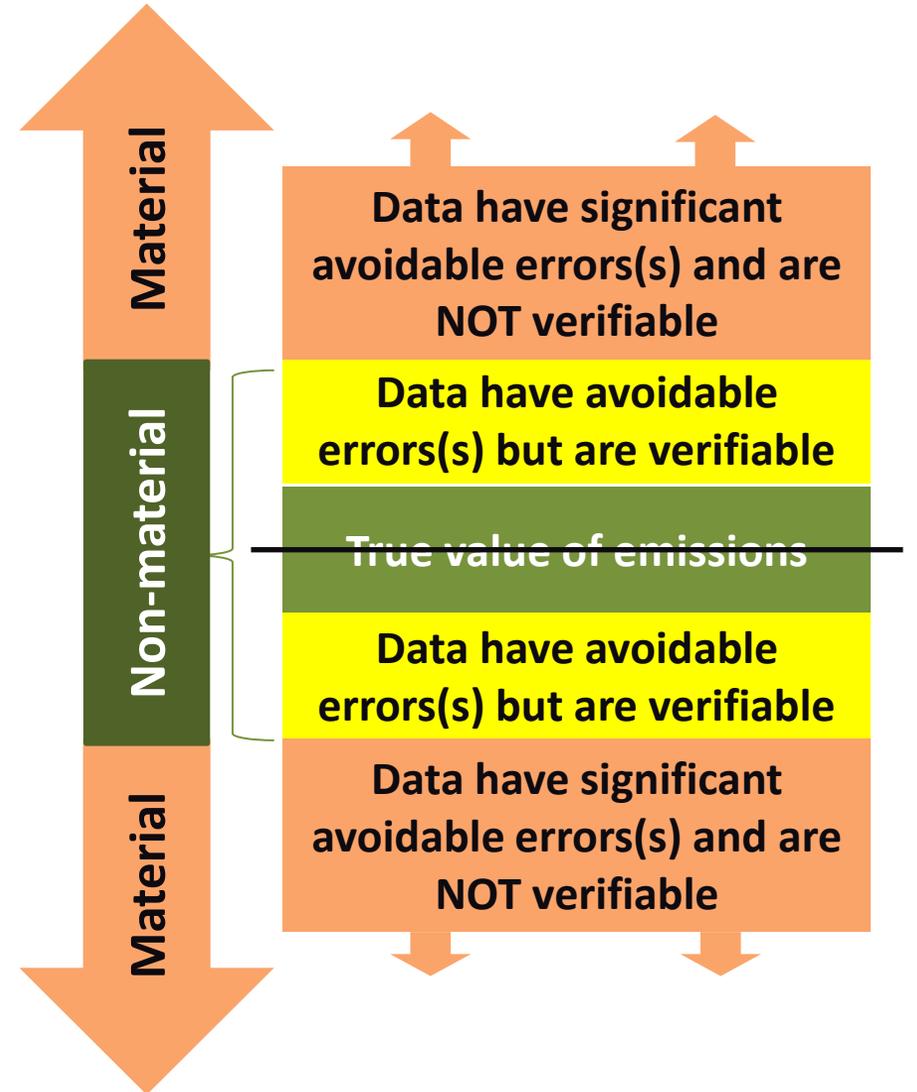
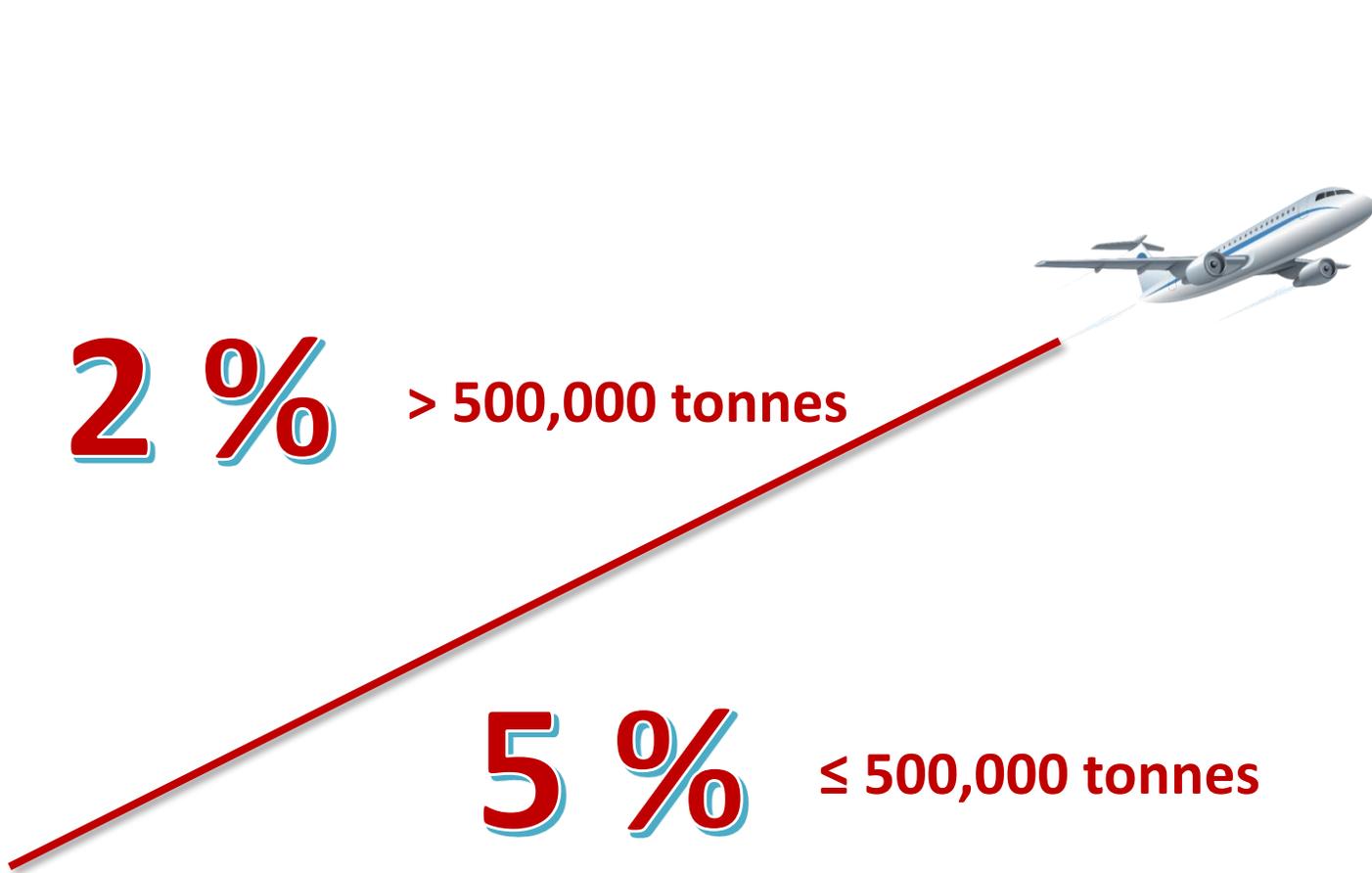


- Contents of the VR is provided in the Annex 16, Volume IV, Appendix 6, 3.10.1
  - Includes all verification-related information
- CORSIA specific content:
  - Determination of compliance of the Emissions Report with the Emissions Monitoring Plan
  - Determination of any non-compliances of the Emissions Monitoring Plan with SARPs

**Demonstration of the Verification Report template after this presentation**



# Materiality Threshold



# Materiality Example

Item	Verification	Reported value	Verification body's value	Difference	Materiality
Flight 1	Incorrect fuel uplift	50	42	8	3.48%
Flight 2	Correct	12	12	0	
Flight 3	Incorrect block-on fuel	15	25	-10	-4.35%
Flight 4	Incorrect fuel uplift	52	42	10	4.35%
...	...	...	...	...	...
Total		230	222	8	3.48%

$$\frac{\text{Difference}}{\text{Total Reported value}} = \text{Materiality}$$

## MISSTATEMENT:

Error, omission, misrepresentation

### Examples

- ✈ Missing flights in the sequence of flights
- ✈ Non addressed data gaps as missing fuel uplift
- ✈ Implausible data, such as:
  - Fuel uplifts larger than tank capacity
  - Block-on fuel higher than Block-off fuel
  - Wrong unit, etc.

may cause



## NON-CONFORMITIES:

Act or omission or an act that is not in accordance with EMP

### Examples

- ✈ Incorrect application of the fuel use monitoring methods
- ✈ Incorrect application of the CERT
- ✈ Incorrect version of the EMP used
- ✈ Required quality procedures not followed, etc.

AO will correct all misstatements and non-conformities discovered during verification



- ✗ Includes material misstatements and/or non-conformities;
- ✗ The scope of verification too limited;
- ✗ No sufficient confidence in data.

→ Advise the AO to contact the State



- ✓ NO misstatements and/or non-conformities

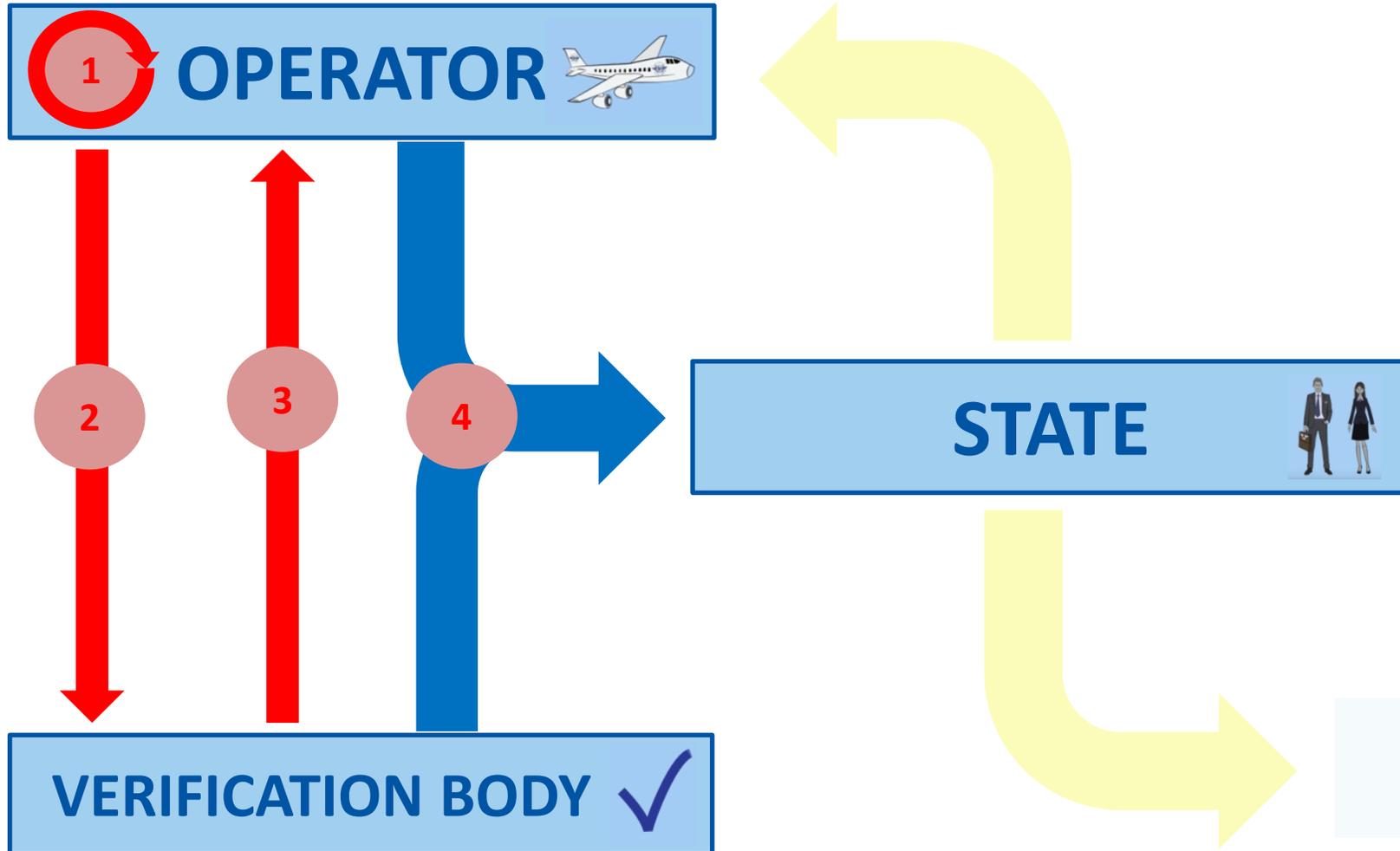
OR



- ✓ Includes non-material misstatements and/or non-conformities;
- ✓ Specify the misstatements and non-conformities.

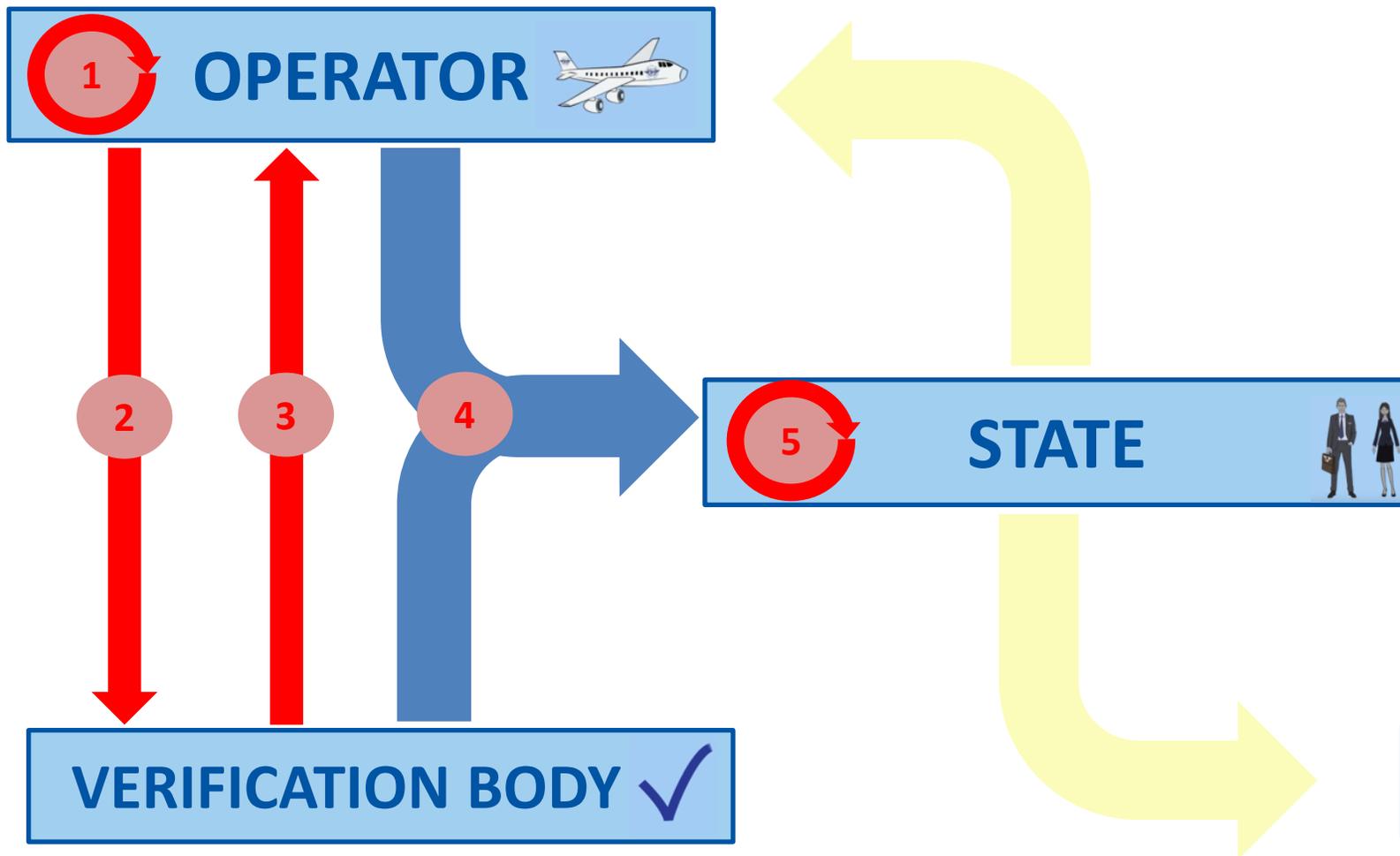


# Verification Information Flow



- 1 Internal pre-verification
- 2 Aeroplane operator submits Emissions Report to an accredited verification body
- 3 Verification body produces Verification Report
- 4 Aeroplane operator and verification body submit Emissions Report and Verification Report to State

# Verification Information Flow



- 1 Internal pre-verification
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- 5 State's order of magnitude check of Emissions Report



# State's Order of Magnitude Check





- The objective of the State's order of magnitude check of an aeroplane operator's Emissions Reports is to assess the completeness of data reported by the operator
- For an operator with an Emissions Report verified as “satisfactory”, the order of magnitude check will take approximately 3 hours

Reference: Annex 16, Volume IV, Part II, Chapter 2, 2.4.1

*Table 3-9 of the ETM provides checklist for States' order of magnitude check of Emissions Reports*

## Main sections:

- Aeroplane Operator
- Emissions Report information
- Aeroplane fleet
- OPTION 1: State pairs
- OPTION 2: Aerodrome pairs
- Data gaps
- Verification body
- Change of data by State
- Communication with aeroplane operator
- Communication with verification body

No.	Question / Issue	Additional Information	Status: OK/Yes/No /Not Applicable	Notes and Results of Checks
	<b><u>Aeroplane Operator</u></b>			
1	<u>Aeroplane Operator</u> /Verification Body both separately submit Emissions Report and Verification Report. Is the content of both submissions identical?	Minimum check: reported fuel consumption and number of flights. Get back to <u>Aeroplane Operator</u> in case of deviations.		
2	Is the name of the <u>Aeroplane Operator</u> given and unambiguous?	Ensure unambiguous identification of <u>Aeroplane Operator</u> . Get back to <u>Aeroplane Operator</u> in case of uncertainties.		
3	Is there a valid ICAO designator for <u>Aeroplane Operating Agencies</u> ? Does it have the correct character length?	Ensure unambiguous identification of <u>Aeroplane Operator</u> . Get back to <u>Aeroplane Operator</u> in case of uncertainties.		
4	Basic information (address, AOC etc.) plausible?	Ensure unambiguous identification of <u>Aeroplane Operator</u> . Get back to <u>Aeroplane Operator</u> in case of uncertainties.		

## Example – Fuel Reported Check

- Are the types of fuel reported plausible and contained in the EMP? (*ETM (Doc 9501), Volume IV, Table 3-9, #31*)
  - Since emissions factors are fuel type-specific, deviation might lead to implausible amount of calculated emissions.

### Example:

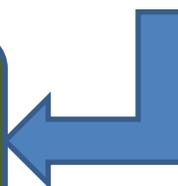
An aeroplane operator has reported the following information in its ER:

- Total amount of Jet A1 Fuel = 250,000 tonnes (FCF = 3.16 tonnes of CO<sub>2</sub>/tonne of fuel)
- Total amount of AvGas = 50,000 tonnes (FCF = 3.10 tonnes of CO<sub>2</sub>/tonne of fuel)

You can use this information to calculate the total CO<sub>2</sub> emissions:

CO<sub>2</sub> emissions = (250,000 x 3.16) + (50,000 x 3.10) = 790,000 + 155,000 = 945,000 tonnes

Compare the result with total reported CO<sub>2</sub> emissions



- Is the given information regarding number of flights plausible?  
(*ETM (Doc 9501), Volume IV, Table 3-9, #30*)
  - Does aeroplane operator report a noticeable small number of flights on typical destinations of the airline?

### Example based on reporting State pairs:

An aeroplane operator has reported the following information in its ER:

- Total no of flights per year = 7,500
- Total number of aeroplanes = 5

You can use this information to calculate an average number of flights per aeroplane:

Average =  $7,500 \text{ flights} / (365 \text{ days} \times 5 \text{ aeroplanes}) = \text{about } 4 \text{ flights/aeroplane/day}$

**Could be considered as plausible for an operator on short- and medium-haul flights**



## Example – Two Specific Fuel Consumption Checks

- Are there State pairs with more than 250 tonnes average fuel consumption per flight? (*ETM (Doc 9501), Volume IV, Table 3-9, #38*)
- Are there State pairs with less than 2.5 tonnes average fuel consumption per flight? (*ETM (Doc 9501), Volume IV, Table 3-9, #39*)

### Example:

State of Departure	State of Arrival	Total No of Flights	Total Amount of Fuel (tonnes)	Average Fuel Consumption
State A	State B	150	250	1.7
State A	State E	150	2,000	13.3
State C	State D	40	15,000	375.0

$250/150 = 1.7$



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# Accreditation Process for Verification Bodies



- A verification body shall be accredited by a national accreditation body in order to be eligible to verify Emissions Reports in CORSIA:
  - ISO 14065:2013 “Greenhouse gases - Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition”
  - CORSIA-specific requirements as described in Annex 16, Volume IV, Appendix 6
- A national accreditation body shall be working in accordance with ISO/IEC 17011 “Conformity assessment - General requirements for accreditation bodies accrediting conformity assessment bodies”

Reference: Annex 16, Volume IV, Part II, (Chapter 2, 2.4.2) and Appendix 6

- How to ensure sufficient availability of accredited verification bodies to aeroplane operators, in support of verification activities under CORSIA?
  - National accreditation bodies and verification bodies need to have the required knowledge
    - ICAO has developed a training course on CORSIA verification for both national accreditation bodies and verification bodies
  - Operators need to have access to verification bodies accredited for CORSIA
    - Annex 16, Volume IV allows an operator to work with a verification body accredited by the national accreditation body of another State
    - ICAO will compile and publish, on an annual basis, a list of verification bodies accredited for CORSIA to facilitate operators' access to accredited verification bodies



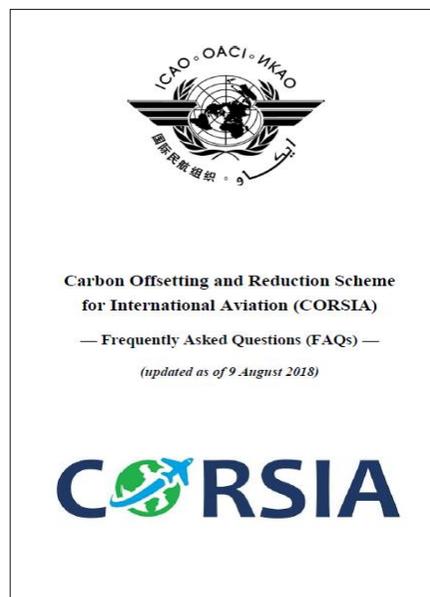
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# Frequently Asked Questions



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



- Is a third-party verification needed when using the ICAO CORSIA CERT?
  - *Yes, an aeroplane operator shall engage a third-party verification body for the verification of its annual Emissions Report also when the ICAO CORSIA CERT has been used for generating an Emissions Report.*
  - Reference in Annex 16, Volume IV: Part II, Chapter 4, 2.4.1.
- Does the verification body have to be from the administrating State?
  - *An aeroplane operator may engage a verification body accredited in another State, as long as the State in which the aeroplane operator has been attributed to recognises this accreditation.*
  - Reference in Annex 16, Volume IV: Part II, Chapter 2, 2.4.2.

- How can an aeroplane operator identify an accredited verification body?
  - *States are required to submit to ICAO a list of nationally-accredited verification bodies. ICAO will compile this information, and make available a list of verification bodies accredited in each State as a part of the ICAO document entitled "CORSA Central Registry (CCR): Information and Data for Transparency" that will be available on the ICAO CORSA website.*
  - *An aeroplane operator may consult this list in order to identify and contract a verification body for the verification of the Emissions Report.*

- Who pays for the third-party verification and what will be the price? Is a price list included in the list of verification bodies to be compiled by ICAO?
  - *An aeroplane operator will be responsible for covering the cost of the third-party verification of its Emissions Reports and Emissions Unit Cancellation Reports.*
  - *Details of the verification (including the price of the verification service) will be agreed and included in the contract between an aeroplane operator and a verification body.*

- What if there is no national accreditation body in a State?
  - *An aeroplane operator may engage a verification body accredited in another State, subject to rules and regulations affecting the provision of verification services in the State to which the aeroplane operator is attributed.*
  - *Reference in Annex 16, Volume IV: Part II, Chapter 2, 2.4.*

- Must a State ensure to have accredited verification bodies through its National Accreditation Body by 30 April 2019?
  - *No. According to Annex 16, Volume IV, Part II, Chapter 1, 1.3.7, and Appendix 1, at least once a year States are asked to submit a list of verification bodies accredited in the State. The first time this is requested is by 30 April 2019. In addition, a State may submit updates to this list on a more frequent basis.*
  - *As the accreditation process takes time to be accomplished, it might not be the case that all States will submit extensive lists of accredited verification bodies before 30 April 2019.*
  - *As the number of verification bodies is expected to increase over time and will not be tied to the annual 30 April deadline, States may submit updates to the list on a more frequent basis as needed.*

- How does a verification team meet the technical expertise requirements?
  - *During the accreditation, the verification body must demonstrate that it has processes in place to ensure the appointment of technically competent verification teams.*
    - *One example of such a process involves conducting a detailed comparison of the requirements outlined in Annex 16, Volume IV, Appendix 6, 2.6.1 and 2.6.2 in the form of a matrix, specifying for each verification team member to what extent each of the requirements listed are being met (gap analysis) and which documents were used to prove a specific expertise.*
  - *It is the task of the verification body to analyse whether the identified distribution of competencies throughout the potential verifiers could be combined into a team that meets all the requirements in Annex 16, Volume IV, Appendix 6, 2.6.*
    - *If there is a gap in technical competency, the verification body needs to develop and document a training approach to resolve the deficits in accordance with its established internal processes.*



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**QUESTIONS?**



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# Demonstration of the Verification Report Template



# Exercise 2: State's Order of Magnitude Check

- Three documents are provided for this exercise:
  - A1 Airways' 2019 Emissions Report (*document 3\_2\_Emissions Report Demonstration.xlsx*)
  - Corresponding Verification Report (*document 4\_2 Verification Report Template Demonstration.xlsx*)
  - State's Order of Magnitude Check Checklist (*document 4\_3\_ETM Order of Magnitude Checklist.docx*)
- By using the Order of Magnitude Check Checklist, your task is to conduct an order of magnitude check to A1 Airways' 2019 Emissions Report.
  - Please use the blank columns of the Checklist to include your notes
- 75 minutes to complete the exercise, followed by 30 minutes feedback discussion



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Thank You