



CORSIA - ORDER OF MAGNITUDE CHECK



**INTERNATIONAL
CIVIL AVIATION
ORGANIZATION**

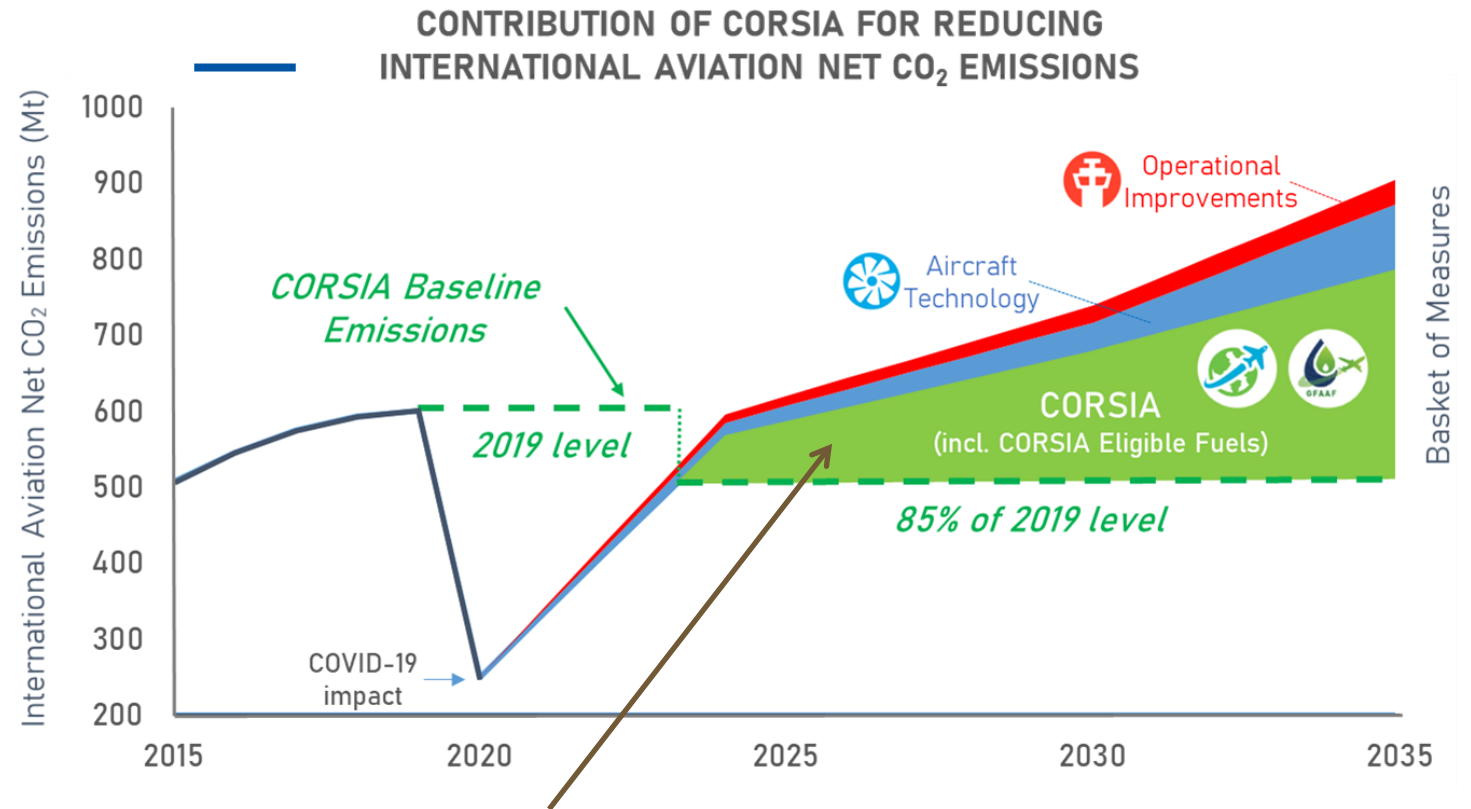


The first global market-based measure for any industry sector

CORSIA complements the other three elements in the ICAO basket of measures:

- technological innovations
- operational improvements
- sustainable aviation fuels

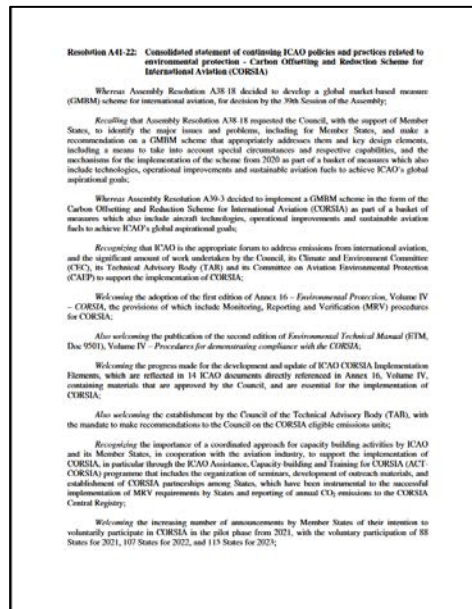
Objective: Achieve ICAO’s global aspirational goal of carbon neutral growth from 2020 (CNG 2020)



CORSIA addresses the remaining “emissions gap” to achieve CNG2020

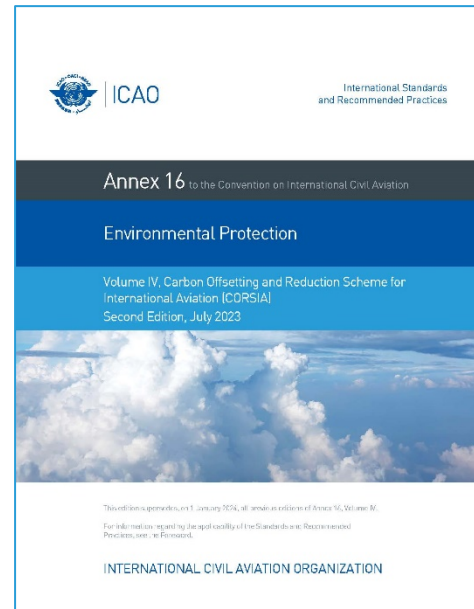
CORSIA Implementation Framework

Assembly Resolution A42-22



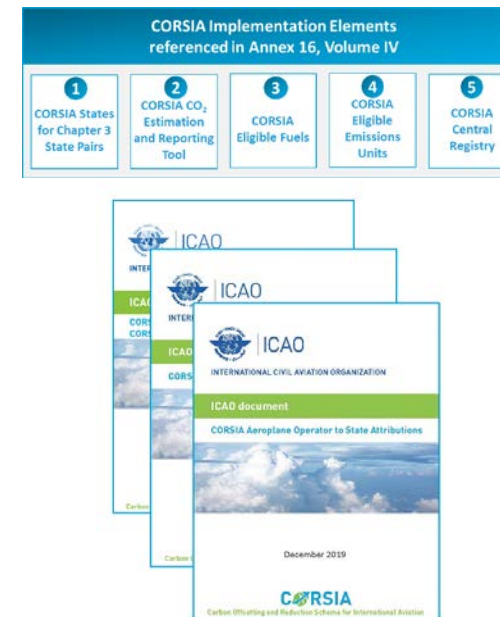
(overall ICAO policy on CORSIA)

Annex 16, Volume IV (2nd edition)



(applicable from 1 January 2024)

CORSIA Implementation Elements and ICAO CORSIA documents



(regularly updated)

Doc 9501 (ETM), Vol. IV (CORSIA) (4th edition)



(supports implementation of Annex 16, Volume IV)

Resolution A42-22: Consolidated statement of continuing ICAO policies and practices related to environmental protection - Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

Whereas Assembly Resolution A38-18 decided to develop a global market-based measure (GMBM) scheme for international aviation, for decision by the 39th Session of the Assembly;

Recalling that Assembly Resolution A38-18 requested the Council, with the support of Member States, to identify the major issues and problems, including for Member States, and make a recommendation on a GMBM scheme that appropriately addresses them and key design elements, including a means to take into account special circumstances and respective capabilities, and the mechanisms for the implementation of the scheme from 2020 as part of a basket of measures which also include technologies, operational improvements and sustainable aviation fuels to achieve ICAO's global aspirational goals;

Whereas Assembly Resolution A39-3 decided to implement a GMBM scheme in the form of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) as part of a basket of measures which also include aircraft technologies, operational improvements and sustainable aviation fuels to achieve ICAO's global aspirational goals;

Recognizing that ICAO is the appropriate forum to address emissions from international aviation, and the significant amount of work undertaken by the Council, its Climate and Environment Committee (CEC), its Technical Advisory Body (TAB) and its Committee on Aviation Environmental Protection (CAEP) to support the implementation of CORSIA;

Welcoming the adoption of the second edition of Annex 16 – *Environmental Protection*, Volume IV – *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, the provisions of which include Monitoring, Reporting and Verification (MRV) procedures for CORSIA;

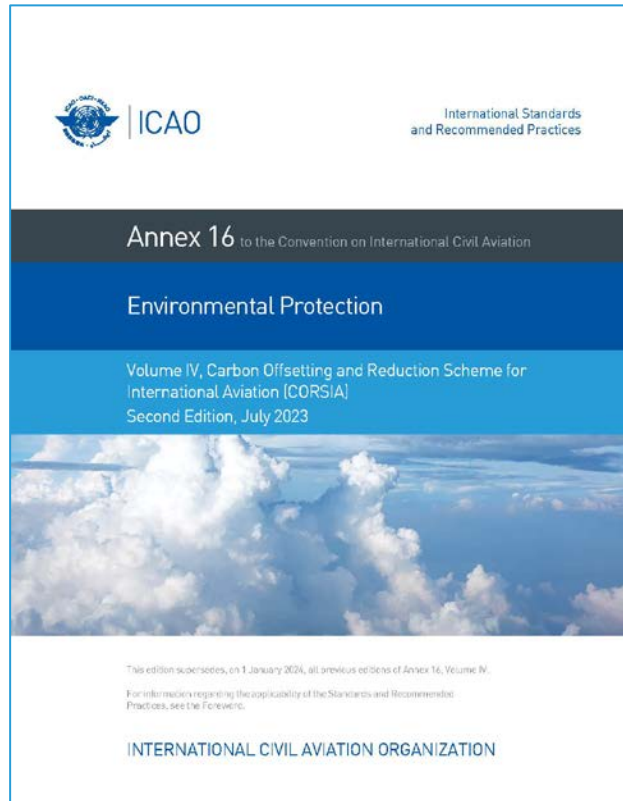
Also welcoming the publication of the third edition of *Environmental Technical Manual (ETM, Doc 9501)*, Volume IV – *Procedures for demonstrating compliance with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*;

Welcoming the progress made for the development and update of ICAO CORSIA Implementation Elements, which are reflected in 14 ICAO documents directly referenced in Annex 16, Volume IV, containing materials that are approved by the Council, and are essential for the implementation of CORSIA;

Also welcoming the establishment by the Council of the Technical Advisory Body (TAB), with the mandate to make recommendations to the Council on the CORSIA eligible emissions units;

Recognizing the importance of a coordinated approach for capacity building activities by ICAO and its Member States, in cooperation with the aviation industry, to support the implementation of CORSIA, in particular through the ICAO Assistance, Capacity-building and Training for CORSIA (ACT-CORSIA) programme that includes the organization of seminars, development of outreach materials, and establishment of CORSIA partnerships among States, which have been instrumental to the successful implementation of MRV requirements by States and reporting of annual CO₂ emissions to the CORSIA Central Registry;

- **Resolution currently in force: A42-22**
 - Adopted by the 42nd Session of the ICAO Assembly in 2025
 - It supersedes previous Assembly Resolutions on CORSIA:
 - A39-3 (2016) – CORSIA agreement
 - A40-19 (2019)
 - A41-22 (2022)



- Edition currently applicable: second edition (applicable since 1 January 2024)
- **Next update** (third edition)
 - Expected to incorporate minor MRV-related adjustments recommended by the ICAO Council’s Committee on Aviation Environmental Protection (CAEP)
 - Distributed to States and relevant International Organizations (State letter 2025/66)
 - Expected to be **applicable from 1 January 2027**

<https://www.icao.int/CORSAIA/sarps-annex-16-volume-iv>

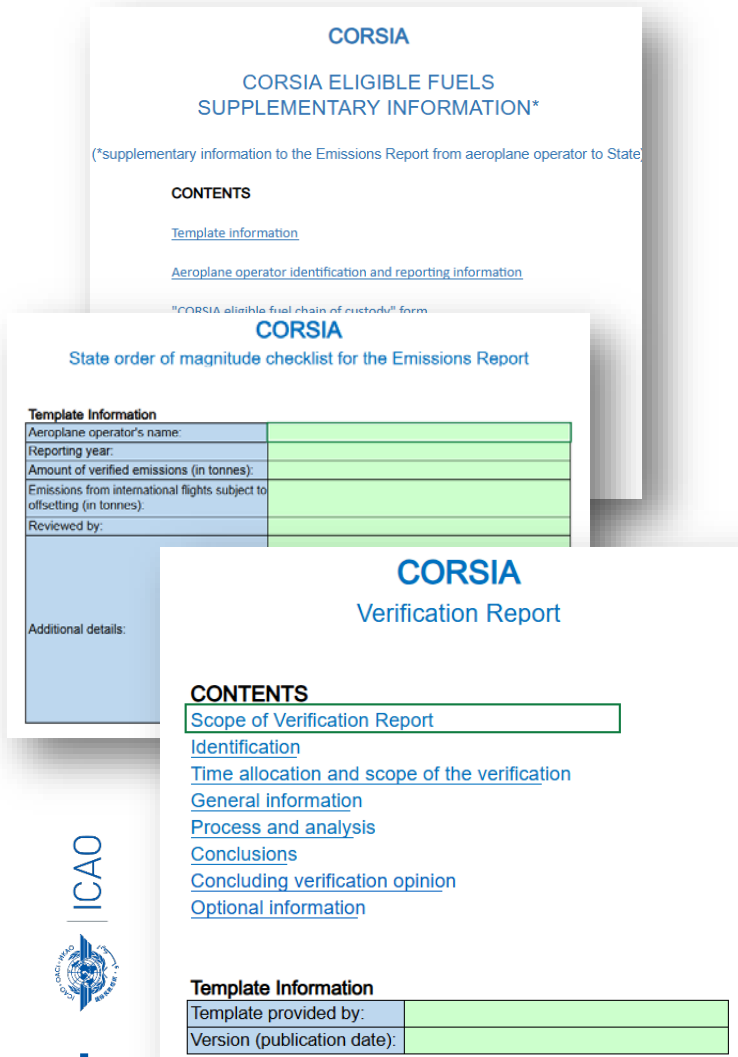




- Current edition (4rth) supports implementation of Annex 16, Volume IV (from 1 January 2024)
 - Further guidance on matters related to CORSIA eligible fuels (CEFs)
 - **New guidance** on verification of emissions reduction claims from CEFs
 - **New section on CEFs in the States' Order of Magnitude checklist**
 - **Restructuring of the CEF claims template** to make it more user-friendly
 - Update of the **Verification Report template** to facilitate the review of **CEF claims**

<https://www.icao.int/CORSA/environmental-technical-manual-volume-iv>

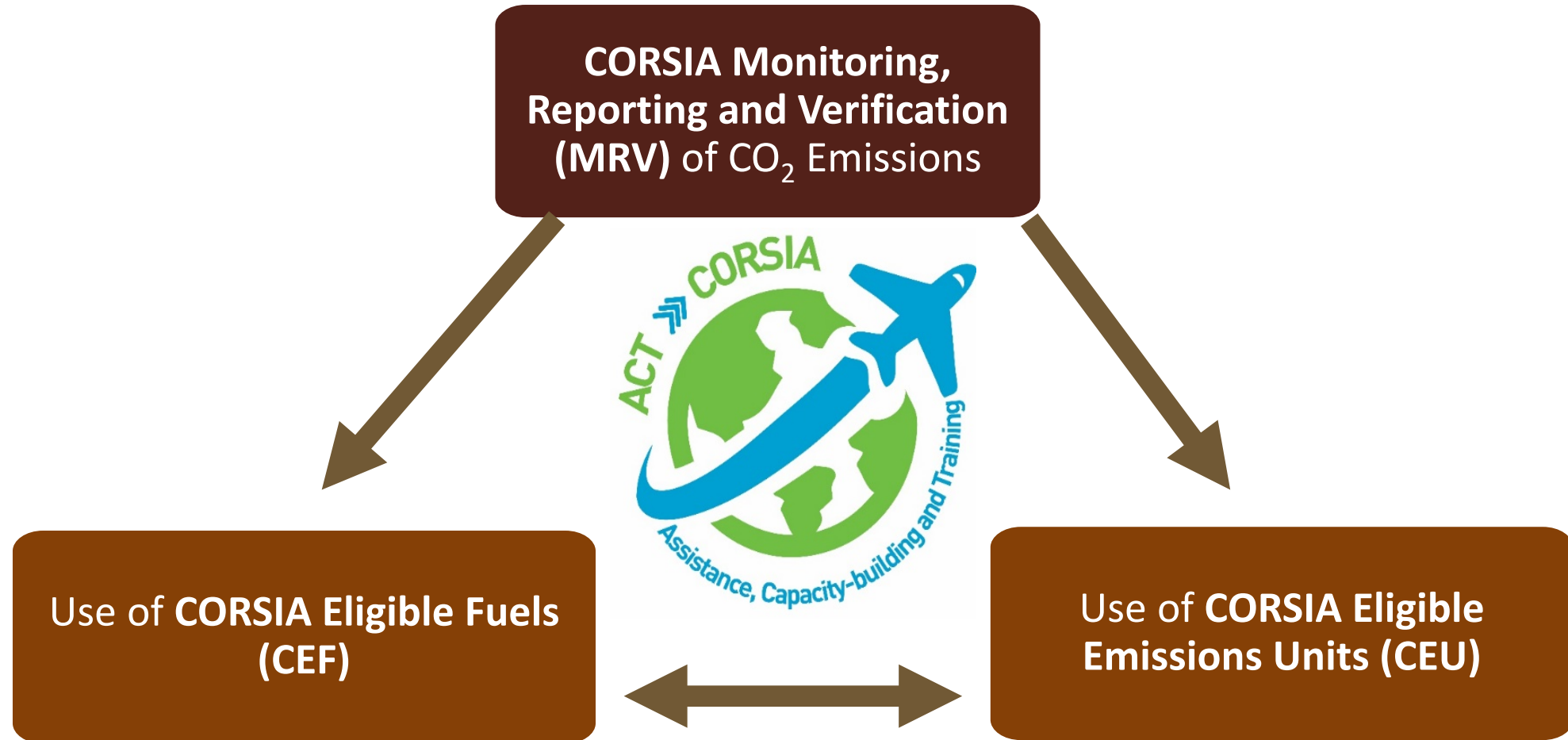




- 3 out of the 6 Standardized Templates have been revised and are available for download

- **Template of CORSIA eligible fuels supplementary information to the Emissions Report**
- **Template of State Order of Magnitude Checklist for Emissions Report**
- **Template of Verification Report**

<https://www.icao.int/CORSIA/standardized-templates>



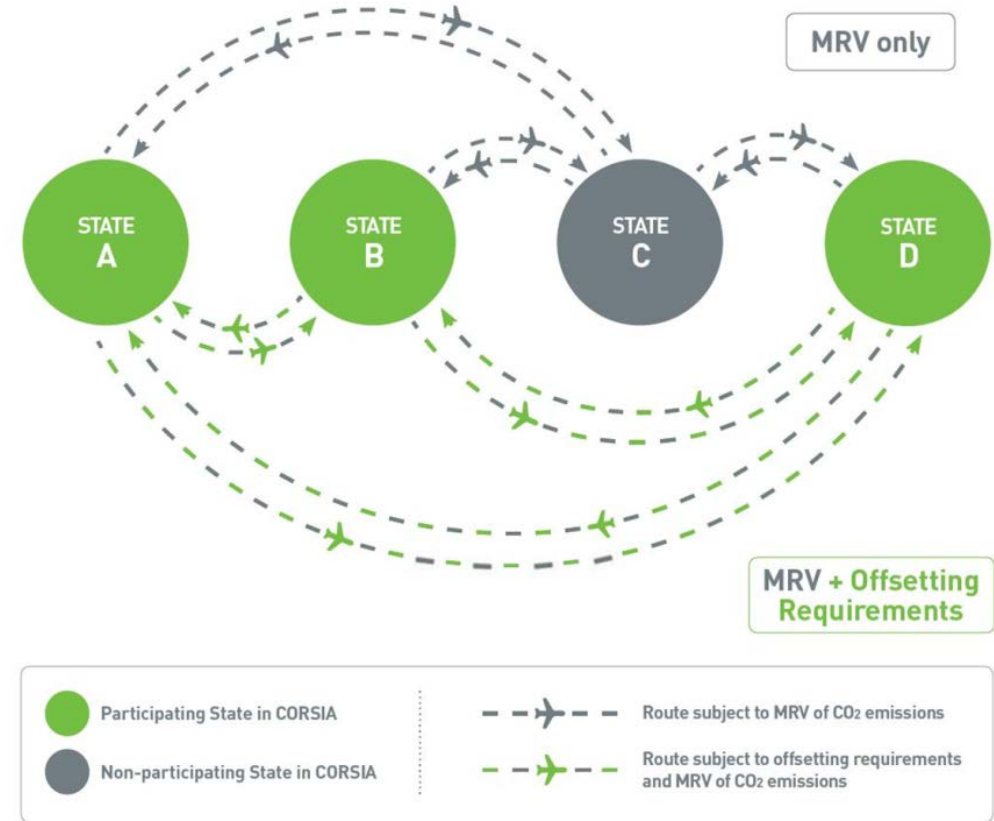
CORSIA offsetting requirements (until 2035) could be met by CEF or CEU

CORSIA CO2 MRV

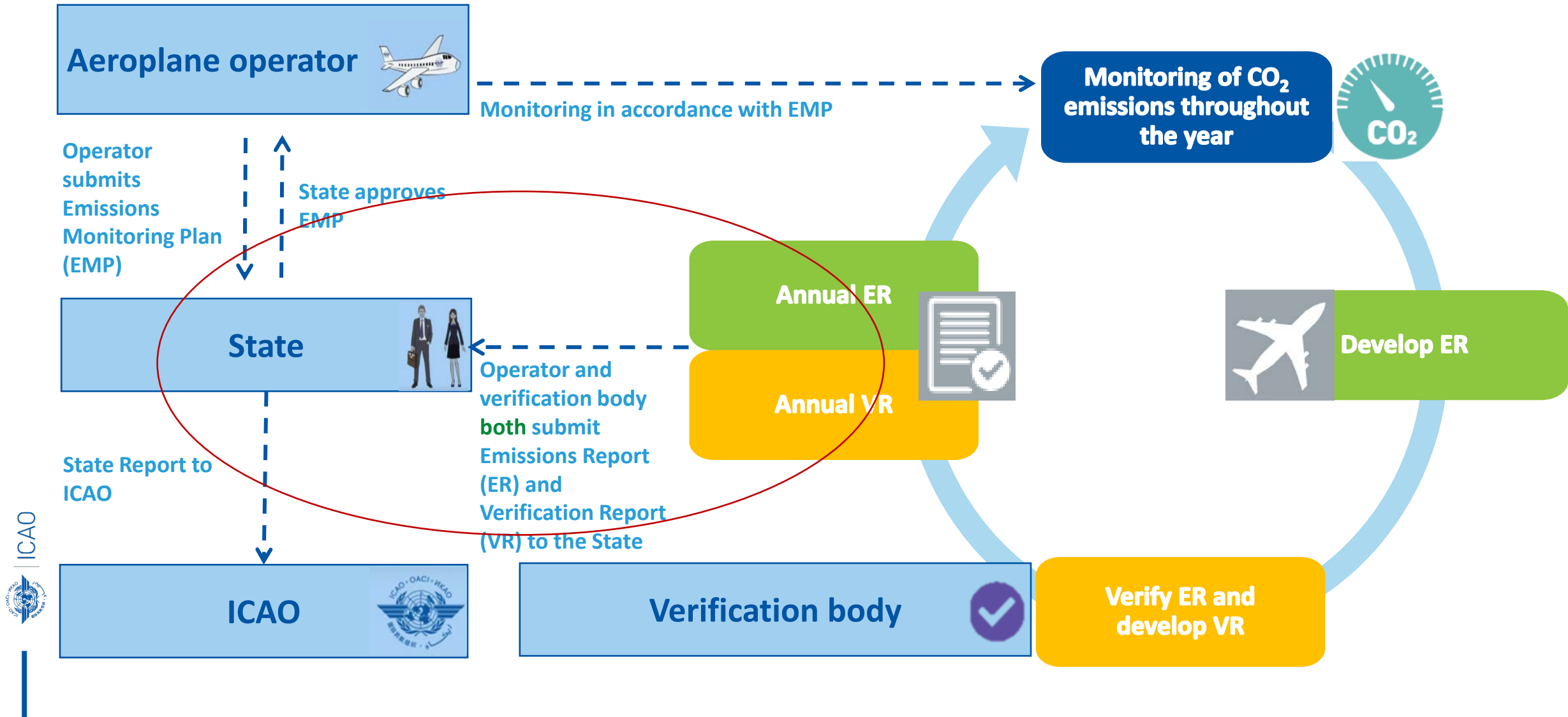
From 1 January 2019, all States with operators performing international flights have to establish a monitoring, reporting and verification (MRV) system for CO₂ emissions.

From 1 January 2019, all operators performing international flights have to monitor CO₂ emissions - operators with emissions more than 10,000 tonnes annually have to verify CO₂ emissions and report to State.

All operators performing international flights between States participating in CORSIA have to comply with the CORSIA offsetting requirements.



CORSIA CO2 MRV



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.

Extract from **Annex 16 vol. 4** and **ETM vol. 4**

2.4.1.6 The State shall perform an **order of magnitude** check of the Emissions Report in accordance with the timeline, as defined in Appendix 1.

*Note.— Further guidance material on the **order of magnitude** check is provided in the Environmental Technical Manual (Doc 9501), Volume IV — Procedures for demonstrating compliance with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).*

3.3.4.4 Order of magnitude check by State

The State will perform an order of magnitude check of the Emissions Report of the aeroplane operator, as described in Annex 16, Volume IV, Part II, Chapter 2, 2.4.1.6. The order of magnitude check will follow a set of standardized requirements, as outlined in Table 3-11. For an average sized aeroplane operator with a satisfactory verified Emissions Report, the order of magnitude check should not take longer than approximately three hours.

State's Order of Magnitude Check

ETM vol. 4, Para 3.3.4.4



Main sections

Aeroplane Operator

Administrative aspects

Emissions Monitoring Plan

Aeroplane fleet

Data gaps

CORSIA Eligible Fuels

Verification body and verification report

Table 3-11. State order of magnitude checklist for the Emissions Report

Insert aeroplane operator's name: _____

Reporting year: _____

Amount of verified emissions (in tonnes): _____

Emissions from international flights subject to offsetting (in tonnes): _____

Reviewed by: _____

Additional details: _____

No	Question/Issue	Additional information	Status: OK/Yes/No/ Not applicable	Notes and results of checks
Aeroplane operator identification				
1	Is the name of the aeroplane operator given and unambiguous? If applicable is there a valid ICAO Designator for aeroplane operating agencies?	4		
4	Has the Emissions Report been submitted in due time?			
5	Are the submitted documents and relevant accompanying documents complete? Are there any blank boxes? Is the Emissions Report verified? Is the Verification Report included?			If not, contact aeroplane operator and/or verification body.
6	The aeroplane operator and 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 aeroplane operator in case of deviations.
7	Has the correct Emissions Report template version been used?			Ensures capturing and reporting fuel consumption according to latest requirements of the applicable reporting.

Template of State Order of Magnitude Checklist for Emissions Report (to be used by States)

An updated standardized template of a State Order of Magnitude Checklist for Emissions Report in the format of a spreadsheet is available to States for download below.

- (EN)
- (FR)
- (SP)
- (RU)
- (AR)
- (ZH)

State's Order of Magnitude Check

Template of State Order of Magnitude Checklist for Emissions Report (to be used by States)

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[\(SP\)](#)
[\(RU\)](#)
[\(AR\)](#)
[\(ZH\)](#)

a3) Reference to approved Emissions Monitoring Plan

No.	Question/Issue	Additional information	Status
12	<p>Has the Emissions Report been created on the basis of an Emissions Monitoring Plan that is available to the State?</p> <p>Is the underlying Emissions Monitoring Plan approved by the State?</p>	<p>If not, the Emissions Monitoring Plan version used by aeroplane operator should be requested. Verification body notes should be considered.</p> <p>If not, investigate the reason. Check and approve the Emissions Monitoring Plan. It has to be ensured that the number of flights and fuel quantities are monitored completely.</p>	
13	<p>Is there any deviation from the approved Emissions Monitoring Plan?</p>	<p>Does the Emissions Report contain information that deviates from the procedures outlined and approved in the Emissions Monitoring Plan? Mainly, data flow and monitoring method have to be checked. Relevant information could also be provided in the Verification Report.</p> <p>If deviations are identified, check if they are described in detail by the aeroplane operator</p>	

Example: Fuel Reported Check

Are the types of fuel reported plausible and contained in the EMP?

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 CO₂/tonne of fuel)
- Total amount of AvGas = 50,000 tonnes (FCF = 3.10 tonnes of CO₂/tonne of fuel)

You can use this information to calculate the total CO₂ emissions:

CO₂ emissions= (250,000 x 3.16) + (50,000 x 3.10) = 790,000 + 155,000 = 945,000 tonnes

Compare the result with total reported CO₂ emissions



Example – Number of Flights Check

Is the given information regarding number of flights plausible?

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 # of flights per year = 7,500
- Total # 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: Correctness Check fuel consumption

28	Are there State pairs or aerodrome pairs with more than 250 tonnes of average fuel consumption per flight?	The calculation is: fuel consumption of respective State pair or aerodrome pair divided by number of flights. In case of fuel consumption greater than 250 tonnes per flight, investigate further with the aeroplane operator. This refers to all reported State pairs.
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→ Please note: This is the maximum tank capacity of an A380

No	Question/Issue	Additional information	Status: OK/Yes/No/ Not applicable	No re of
29	Are there State pairs or aerodrome pairs with less than 1 tonne of fuel consumption per flight?	The calculation is: fuel consumption of respective State pair or aerodrome pair divided by amount of flights. In case of fuel consumption below 1 tonne per flight, investigate further with the aeroplane operator. This refers to all reported State pairs.		

→ Please note: This is equivalent of <1h flight time with an A320



Departure		Arrival		Total No. of flights	Type of Fuel	Total Amount of Fuel used (in tonnes)	Fuel Conversion Factors	CO ₂ emissions (in tonnes)	Total Amount of Fuel used / Total No. Of flights
ICAO airport code	State	ICAO airport code	State						
ZWWW	China	OMSJ	United Arab Emirates	146	Jet-A1	1,906	3.16	6,022.96	13.1
OMSJ	United Arab Emirates	ZWWW	China	146	Jet-A1	171	3.16	540.36	1.2
KATL	United States	EDDM	Germany	30	Jet-A1	12,000	3.16	37,920.00	400.0
KATL	United States	EDDM	Germany	166	Jet-A1	11,851	3.16	37,449.16	71.4

→ The fuel consumption appears to be outside the range typically expected. Further checks / enquiries required.

Example : Inbound/Outbound flights per State (almost) identical?

State of Departure	State of Arrival	Total No. of flights	Type of Fuel
Germany	Kenya	100	Jet-A1
Kenya	Burkina Faso	50	Jet-A1
Burkina Faso	Germany	100	Jet-A1



	Departures	Arrivals	Gap
Germany	100	100	0 ✓
Kenya	50	100	50 !
Burkina Faso	100	50	50 !

→ Departures from and arrivals at any State in the ER should be roughly equal

State's Order of Magnitude Check

Template of State Order of Magnitude Checklist for Emissions Report (to be used by States)

An updated standardized template of a State Order of Magnitude Checklist for Emissions Report in the format of a spreadsheet is available to States for download below.

(FN) (FR) (SP) (RI) (AR) (7H)

a7) CORSIA eligible fuels (CEF)

No.	Question/Issue	Additional information	S
38	Is the sum of emissions reductions claimed correct and supported by attached Proof of Sustainability (PoS) or Proof of Compliance (PoC) documentation confirming eligibility under CORSIA?	The State should, at a minimum, cross-check CEF claim totals between the Emissions Report and the Verification Report, and conduct spot checks of PoS or PoC documentation for individual batches.	
39	Does a spot check of the documentation confirm that claimed volumes were blended before the end of the compliance	As per Annex 16, Volume IV, Part II, Chapter 2, 2.3.3.3.	
40	Confirm that the verification body performed checks on double claiming (Verification Report). Did the verification body report any potential risk of double claiming (inside and outside of the CORSIA verification scope)?	The verification body should compare CEF batch numbers with those contained in the CORSIA Central Registry (CCR) and Sustainability Certification Schemes (SCSs) annual reports from the current compliance period, where available, as well as the compliance period immediately preceding it. If a risk of double claiming has been identified by the verification body, further investigation may be warranted, including with authorities in other States (if risk is with another claim in another State, or internally with other State entities).	
41	For a representative sample size, compare CEF batch numbers with production information contained in the SCS annual reports for the most recent reporting year to ensure consistency.	Due to publication timelines, the verification body would not have had access to this latest SCS annual report. As such, it falls to the State to carry out the comparison of CEF batch numbers with production information contained in the SCS annual report for the most recent reporting year.	

- The **Proof of Sustainability (PoS)** is the industry best practice and is a central document for the verification
- It is **created by the fuel producer** and other certified entities in the supply chain to demonstrate the sustainability characteristics of a fuel
- AO presents Proof of Sustainability or Proof of Compliance (PoC) to verifier and checks against the Emissions Report and CEF reporting template
- CORSIA verifier must trace back PoS/PoC documentation to the last certified entity
- CORSIA verifier verifies evidence of purchase, blending, delivery and the mass of the CORSIA eligible fuel

State's Order of Magnitude Check

Guidance materials and Supporting Documents

The "[Guidance on the verification of CORSIA Eligible Fuel Claims](#)" supports verification bodies in the implementation of the verification requirements contained in the second edition of Annex 16 Vol IV, more specifically on matters related to the verification of aeroplane operators' claims of emissions reductions from the use of CORSIA eligible fuels (CEF).



<https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/Guidance-on-verification-of-CEF-claims.pdf>



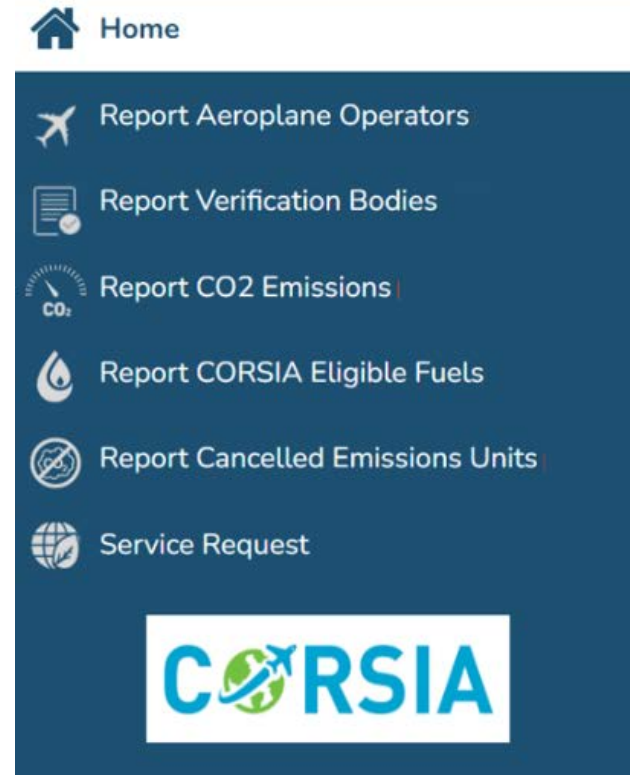
- 4.11 What is the definition of "CORSIA Eligible Fuels"?
- 4.12 Which sustainability criteria shall be met by CORSIA Eligible Fuels?
- 4.13 Which life cycle emissions values will be used for calculating the emissions reductions from CORSIA Eligible Fuels?
- 4.14 What constitutes the life cycle emission value of a CORSIA Eligible Fuel?
- 4.15 Who certifies CORSIA Eligible Fuel in order to be used in CORSIA?
- 4.16 What are the requirements for Sustainability Certification Schemes?
- 4.17 Where can one find a list of approved Sustainability Certification Schemes?
- 4.18 Can an aeroplane operator claim all the CORSIA Eligible Fuel it has purchased?
- 4.19 Can the same emission reduction from a CEF be claimed by the same aeroplane operator in different GHG schemes?
- 4.20 Which measures are put in place to avoid double claiming in relation to CORSIA Eligible Fuels?
- 4.21 Which date is relevant in order to claim a batch of CORSIA eligible fuel?

Frequently Asked Questions on the CORSIA website
<https://www.icao.int/CORSIA/frequently-asked-questions>

- Essential for the collection and publication of CORSIA data.
- The CCR allows:
 - States to submit information that is related to CORSIA, and
 - ICAO to compile information specific to the implementation and transparency of CORSIA.
- Consolidated data from the CCR is published on the ICAO CORSIA website for public access.



CORSIA Central Registry (CCR)



173
States have access to CCR

281
CCR Users Accounts

Information to be reported by States to ICAO through the CCR and associated deadlines

State Report	CORSIA First Phase			CORSIA Second Phase		
	2024	2025	2026	2027	2028	2029
Aeroplane Operators	30 Nov <i>(2024 AOs)</i>	30 Nov <i>(2025 AOs)</i>	30 Nov <i>(2026 AOs)</i>	30 Nov <i>(2027 AOs)</i>	30 Nov <i>(2028 AOs)</i>	30 Nov <i>(2029 AOs)</i>
Verification Bodies	30 Nov <i>(2024 VBs)</i>	30 Nov <i>(2025 VBs)</i>	30 Nov <i>(2026 VBs)</i>	30 Nov <i>(2027 VBs)</i>	30 Nov <i>(2028 VBs)</i>	30 Nov <i>(2029 VBs)</i>
CO ₂ Emissions	31 Jul <i>(2023 Emissions)</i>	31 Jul <i>(2024 Emissions)</i>	31 Jul <i>(2025 Emissions)</i>	31 Jul <i>(2026 Emissions)</i>	31 Jul <i>(2027 Emissions)</i>	31 Jul <i>(2028 Emissions)</i>
CORSIA Eligible Fuels*	31 Jul <i>(2023 CEF)</i>	31 Jul <i>(2024 CEF)</i>	31 Jul <i>(2025 CEF)</i>	31 Jul <i>(2024-2026 CEF)</i>	31 Jul <i>(2027 CEF)</i>	31 Jul <i>(2028 CEF)</i>
Cancelled Emissions Units					31 Jul <i>(2024 – 2026 CEUs)</i>	

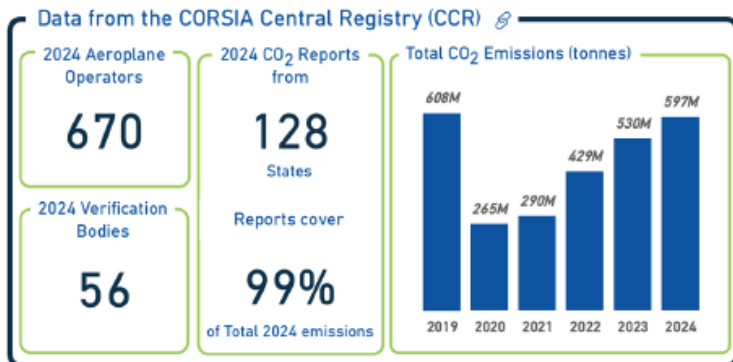
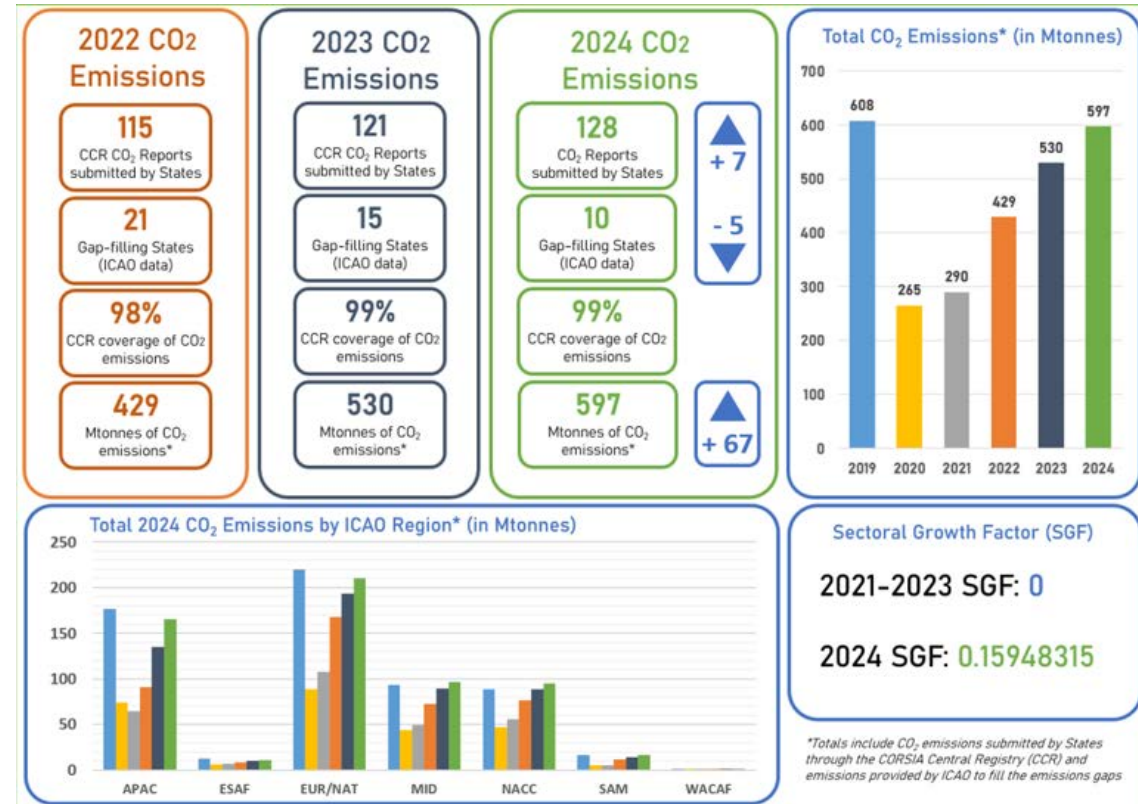
* CEF reported annually or once at the end of each three-year compliance cycle

Annex 16, Volume IV - Appendix 1: Information to be reported by States to ICAO through the CCR and associated deadlines.

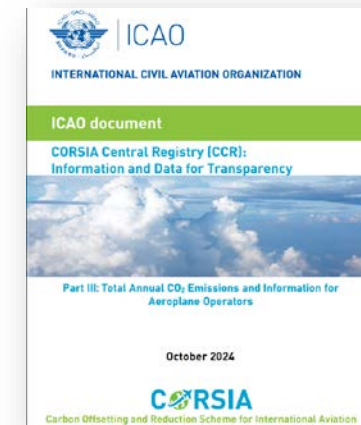
CORSIA Central Registry (CCR)

Unprecedented number of States reported 2024 CO₂ emissions through the CCR!

99% coverage maintained



CCR Data



The information presented here is based on the currently applicable editions of the ICAO documents for CORSIA implementation directly referenced in Annex 16, Volume IV and available on the ICAO CORSIA public website.

Additional Information

- CORSIA Homepage
- ICAO publishes monthly newsletters to update stakeholder on CORSIA Implementation
- CORSIA Frequently Asked Questions (FAQs)



Template of State Order of Magnitude Checklist for Emissions Report (to be used by States)

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- (EN)
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- (ZH)

Thank You

