



ICAO

ENVIRONMENT

ICAO Regional Seminar on CORSIA

Session 5: CORSIA Calculation of Offsetting Requirements

ICAO Secretariat



A reminder from the previous presentations...

- MRV system is a key component of CORSIA implementation:
 - Monitoring of fuel use on each international flight and calculation of related CO₂ emissions
 - Reporting of CO₂ emissions information between operators, States and ICAO
 - Verification of reported emissions data to ensure completeness and avoid misstatements
- ICAO CORSIA Central Registry to collect, manage, analyze, report and publish data:
 - States to submit CORSIA specific data/information to ICAO
 - ICAO to prepare and present consolidated data via webpage for public access

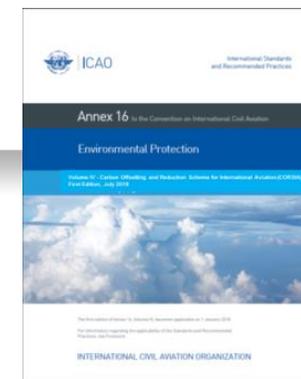
This presentation...

- Overview how CORSIA Offsetting Requirements are calculated (based on the MRV system)
- Overview how compliance with the CORSIA Offsetting Requirements is achieved (linked with the ICAO CORSIA Central Registry)



Session 5, Part 1: CORSIA Calculation of Offsetting Requirements





Part II, Chapter 3 of the draft Annex 16, Volume IV:

CO₂ Offsetting Requirements from International Flights and Emissions Reductions from the Use of Sustainable Aviation Fuels, specifically:

- Applicability of CO₂ Offsetting Requirements (paragraph 3.1)
- CO₂ Offsetting Requirements for Individual Operators (paragraph 3.2)
- Emissions Reductions from the Use of Sustainable Aviation Fuels (paragraph 3.3)
- CO₂ Offsetting Requirements with Emissions Reductions from the Use of Sustainable Aviation Fuels (paragraph 3.4)

- Draft Annex 16 Vol. IV – Part II Chapter 3, paragraph 3.1 *



- From 1 January 2021 to 31 December 2035, the offsetting requirements shall be applicable to an aeroplane operator with international flights between participating States.
- New entrants (aeroplane operators) are exempted from the CORSIA offsetting requirements for the first 3 years or until its annual emissions exceed 0.1% of total 2020 emissions, whichever comes first.

- Draft ICAO CORSIA Implementation Elements
 - One of the Implementation Elements "CORSIA States for Chapter 3 State Pairs" will provide information on States participating in the CORSIA that define the international routes between State pairs subject to offsetting requirements for every year from 2021.

Applicability of CO₂ Offsetting Requirements: Voluntary Participation

- As per Assembly Resolution A39-3, the ICAO Secretariat provides public updated information on the States that volunteer to participate in the CORSIA.
- As of 11 January 2018, **73 States**, representing **87.7%** of international aviation activity (2014 RTK data), intend to voluntarily participate in the CORSIA from its outset.

NOTE: Updates to this information can be found on the ICAO CORSIA website:

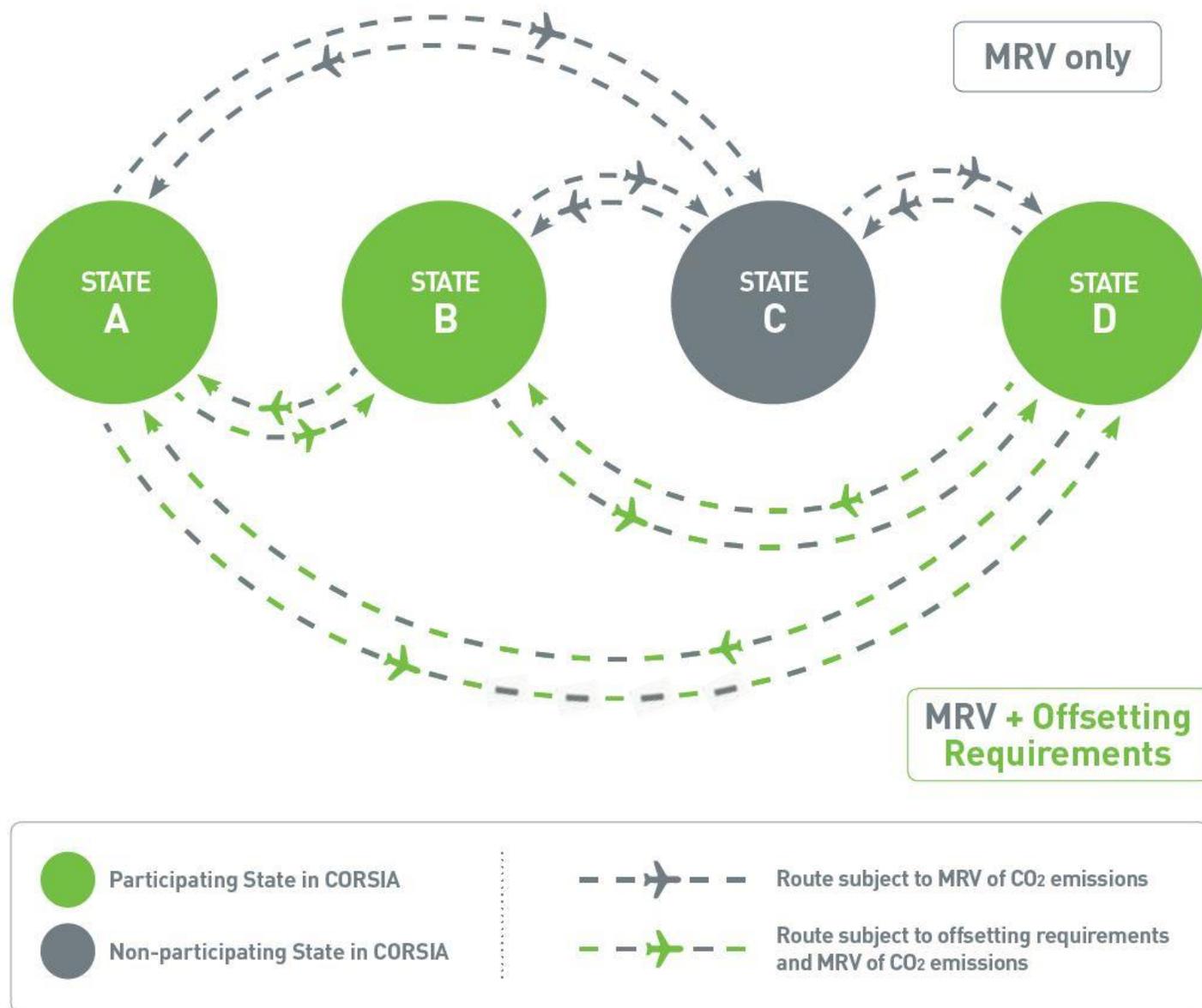
<http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx>

ALBANIA	GUATEMALA	POLAND
ARMENIA	HUNGARY	PORTUGAL
AUSTRALIA	ICELAND	QATAR
AUSTRIA	INDONESIA	REPUBLIC OF KOREA
AZERBAIJAN	IRELAND	REPUBLIC OF MOLDOVA
BELGIUM	ISRAEL	ROMANIA
BOSNIA AND HERZEGOVINA	ITALY	SAN MARINO
BOTSWANA	JAMAICA	SAUDI ARABIA
BULGARIA	JAPAN	SERBIA
BURKINA FASO	KENYA	SINGAPORE
CANADA	LATVIA	SLOVAKIA
CHINA	LITHUANIA	SLOVENIA
COSTA RICA	LUXEMBOURG	SPAIN
CROATIA	MALAYSIA	SWEDEN
CYPRUS	MALTA	SWITZERLAND
CZECH REPUBLIC	MARSHALL ISLANDS	THAILAND
DENMARK	MEXICO	THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA
EL SALVADOR	MONACO	TURKEY
ESTONIA	MONTENEGRO	UKRAINE
FINLAND	NAMIBIA	UNITED ARAB EMIRATES
FRANCE	NETHERLANDS	UNITED KINGDOM
GABON	NEW ZEALAND	UNITED STATES
GEORGIA	NIGERIA	ZAMBIA
GERMANY	NORWAY	
GREECE	PAPUA NEW GUINEA	

Applicability of CO₂ Offsetting Requirements: Route-based Approach

Routes subject to MRV of CO₂ emissions: ALL ICAO MEMBER STATES with aeroplane operators conducting international flights are required to monitor, report and verify (MRV) CO₂ emissions from these flights every year from 2019, independent of their participation in the CORSIA.

Routes subject to offsetting requirements: Emissions from international flights where both the origin and destination States participate in the CORSIA, are subject to offsetting requirements every year from 2021.



- Draft Annex 16 Vol. IV – Part II Chapter 3, paragraph 3.2
 - The State shall calculate, for each of the operators attributed to it, the amount of CO₂ emissions required to be offset in a given year prior to consideration of the sustainable aviation fuels:

$$OR_y = \%S_y * (OE_y * SGF_y) + \%O_y * (OE_y * OGF_y)$$



HOW TO CALCULATE CO₂ OFFSET REQUIREMENTS?

Operator's annual emissions **X** Growth Factor = CO₂ offset requirements

The Growth Factor changes every year taking into account both the sectoral and the individual operator's emissions growth. The Growth Factor is the percent increase in the amount of emissions from the baseline to a given future year, and is calculated by ICAO.



OR_y = Offsetting requirements in year y;

OE_y = CO₂ emissions covered by CORSIA in year y;

SGF_y = Sector's Growth Factor;

OGF_y = Individual growth factor;

%S_y = Per cent sectoral in year y;

%O_y = Per cent individual in year y.



- 2021 - 2029: 100% sectoral approach:

$$OR_y = OE_y \times \frac{(SE_y - SE_{B,y})}{SE_y}$$

Operator's requirements in year y (from 2021) →

Operator's emissions covered by the CORSIA in year y (from 2021) ↑

SGF_y - Sector's Growth Factor in year y (from 2021)

Sectoral emissions in baseline (av. 2019/2020) with route-coverage by CORSIA in year y

Sectoral emissions, with route-coverage by CORSIA in year y

In pilot phase (2021-2023), each State can choose OE_y either:

- The operator's emissions in a given year (i.e. 2021, 2022, 2023); or
- The operator's emissions referring back to a single year of 2020.

The State shall notify ICAO which option it has selected by 30 June 2020.

Note: Sector's Growth Factor (SGF_y) is calculated by ICAO every year from 2021 and available through the ICAO CORSIA Central Registry (CCR).

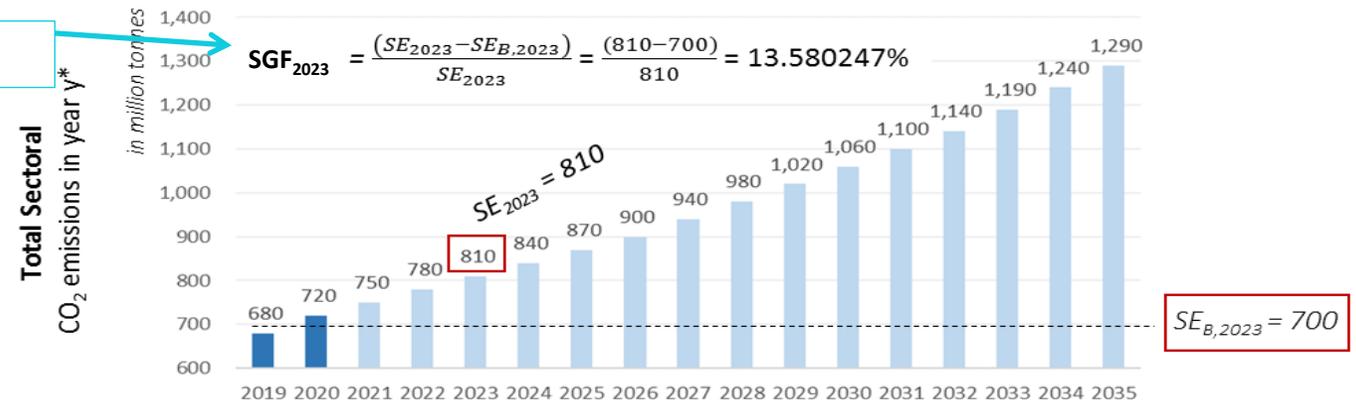
In practice, the State will...

1. Use the operator's reported emissions
2. Use the sector's growth factor, calculated by ICAO
3. Multiply 1. with 2. to determine the operator's offsetting requirements

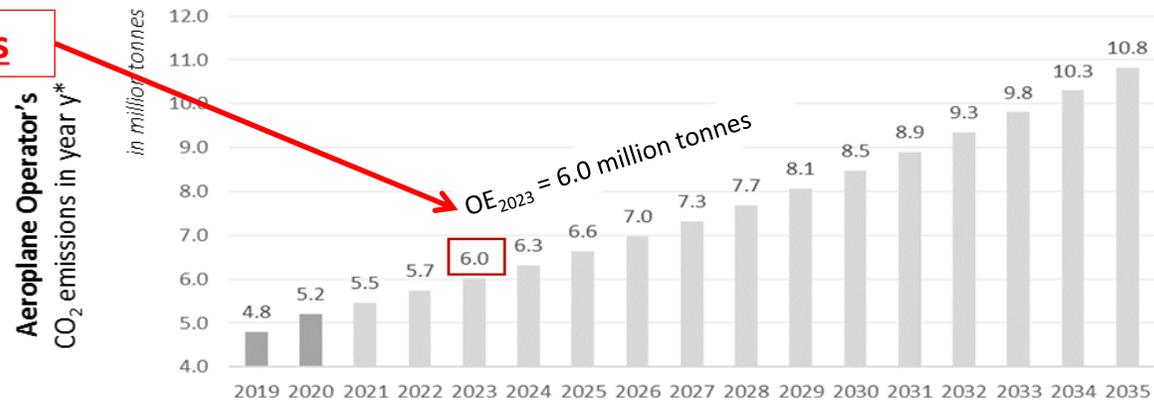
CO₂ Offsetting Requirements for Individual Operators

Example of how the State would calculate offsetting requirements in 2023 if it chooses to use the aeroplane operator's CO₂ emissions in a given year (i.e. 2023).

Calculated by ICAO



Reported by operators



* from flights subject to offsetting requirements, as defined in Annex 16 Volume IV, Part II, Chapter 3, 3.1

Illustration of Calculation of Offsetting Requirements in year y e.g., 2023 (if the State chooses to use the Aeroplane Operator's CO₂ emissions in the given year y)

Calculated by States

$OR_{2023} = OE_{2023} * SGF_{2023} = 6.0 \text{ million tonnes} * 13.580247\% = 814,815 \text{ tonnes}$

where:

- OR_y = Aeroplane Operator's offsetting requirements in the given year y;
- OE_y = Aeroplane Operator's CO₂ emissions covered by Annex 16 Volume IV, Part II, Chapter 3, 3.1 in the given year y;
- and
- SGF_y = Sector's Growth Factor.

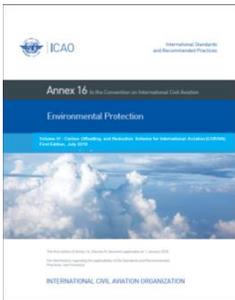
Emissions Reductions from the Use of Sustainable Aviation Fuels (SAF)

- Recap: From 2021, operators can claim emissions reductions by reporting on SAF.

Covered in sessions #2 and #3

- Draft Annex 16 Vol. IV – Part II Chapter 3, paragraph 3.3

- The aeroplane operator that intends to claim for emissions reductions from the use of sustainable aviation fuels (SAF) in a given year shall compute emissions reductions as follow:



$$ER_y = FCF * \left[\sum_f MS_{f,y} * \left(1 - \frac{LS_f}{LC} \right) \right]$$

ER_y = Emissions Reductions from the use of sustainable aviation fuels in the given year y (in tonnes);
 FCF = Fuel Conversion Factor, equal to 3.16 kg CO₂/kg fuel for Jet-A fuel and 3.10 kg CO₂/kg fuel or AvGas or Jet-B fuel;
 $MS_{f,y}$ = Total mass of a neat (*unblended*) sustainable aviation fuel claimed in the given year y (in tonnes);
 LS_f = Life cycle emissions value for a sustainable aviation fuel (in gCO₂e/MJ); and
 LC = Life cycle emissions values for a conventional aviation fuel (= 89 gCO₂e/MJ for jet fuel, and =95 gCO₂e/MJ for AvGas).

Emissions Reductions from the Use of Sustainable Aviation Fuels

- Draft ICAO CORSIA Implementation Elements
 - One of the Implementation Elements "CORSIA Sustainable Aviation Fuels" will provide default life cycle emissions values for different fuel conversion processes for SAF, and methodologies for calculation of actual life cycle emissions values, as well as sustainability criteria and Sustainability Certification Schemes (SCSs) that can certify aviation alternative fuels against the sustainability criteria.

In practice, the operator will...

1. Use the amounts of SAF purchased, based on purchase records
2. Use the life-cycle emissions values of SAF to determine emissions reduction factors
3. Submit valid sustainability certification document
4. Report SAF benefits (see session #3 for reporting) to claim reduction of CORSIA offsetting requirements

CO₂ Offsetting Requirements with Emissions Reductions from the Use of Sustainable Aviation Fuels

- **Final offsetting requirements** are the those CO₂ emissions required to be offset and are determined by subtracting the requirements with emissions reductions from the use of SAF
- Draft Annex 16 Vol. IV – Part II Chapter 3, paragraph 3.4
 - The amount of CO₂ emissions required to be offset by an operator, after taking into account emissions reductions from the use of SAF in a given year (2021 - 2035), shall be calculated by the State:

$$FOR_c = (OR_{1,c} + OR_{2,c} + OR_{3,c}) - (ER_{1,c} + ER_{2,c} + ER_{3,c})$$

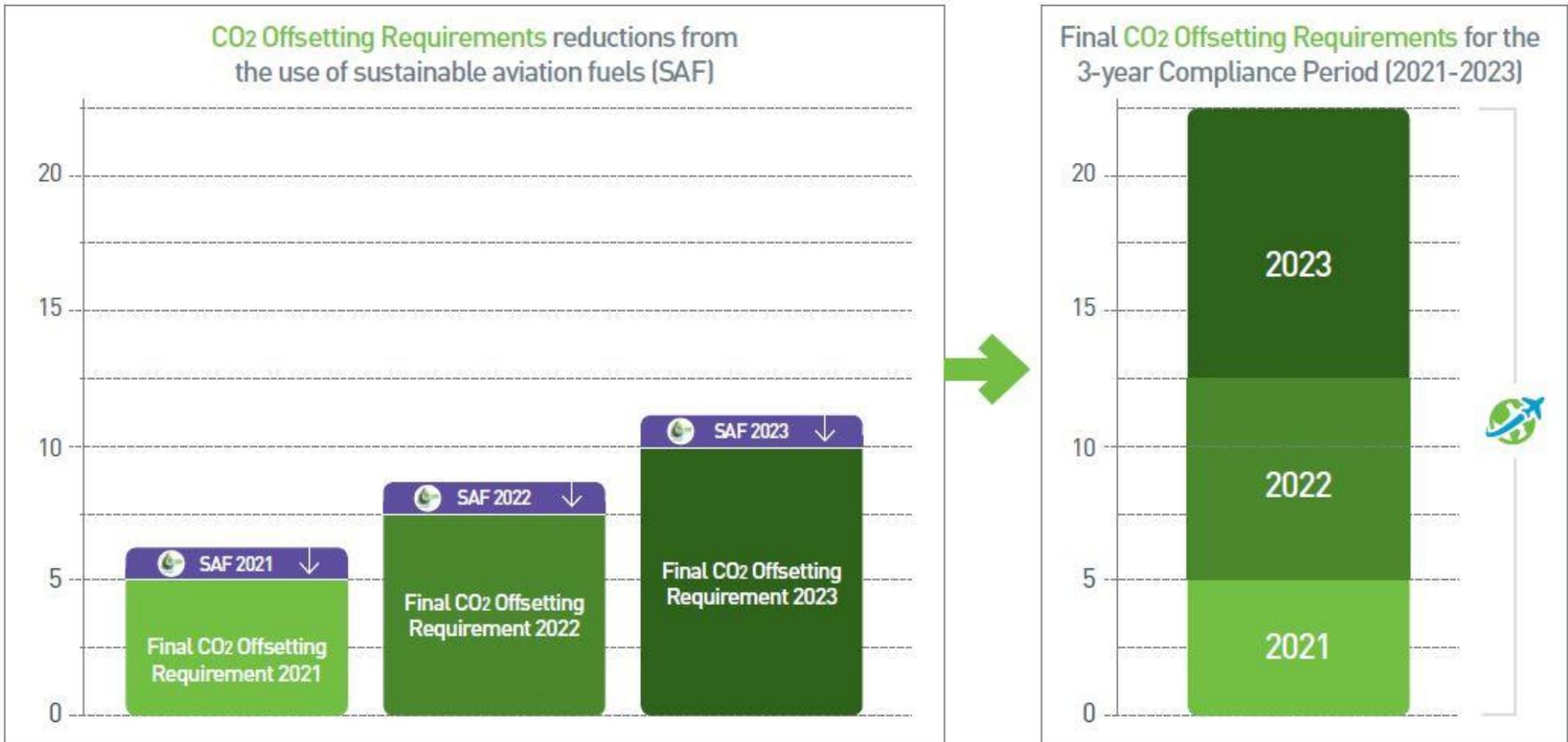
FOR_c = Operator's final offsetting requirements in given compliance period c;
 OR_{y,c} = Operator's offsetting requirements in given year of compliance period c;
 ER_{y,c} = Emissions reductions from use of SAF in given year of compliance period c.

***Recommendation:** The aeroplane operator is encouraged to make sustainable aviation fuel claims on an annual basis. However, the aeroplane operator has the option to decide when to make a sustainable aviation fuel claim within a given compliance period.*

In practice, the State will... sum up the operator's offsetting requirements for the 3 year compliance cycle, and corresponding reductions from SAF, to determine the operator's final offsetting requirements during the cycle.

CO₂ Offsetting Requirements with Emissions Reductions from the Use of Sustainable Aviation Fuels

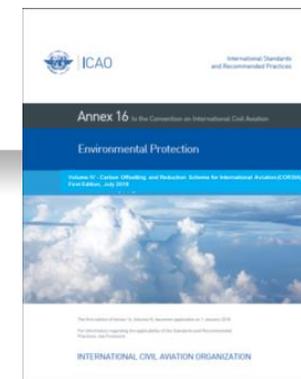
The State accounts for the benefits from the use of SAF and informs the operator of its final CO₂ offsetting requirements for a 3-year compliance period.





Session 5, Part 2: Compliance with the CORSIA Offsetting Requirements





Part II, Chapter 4 of the draft Annex 16, Volume IV:

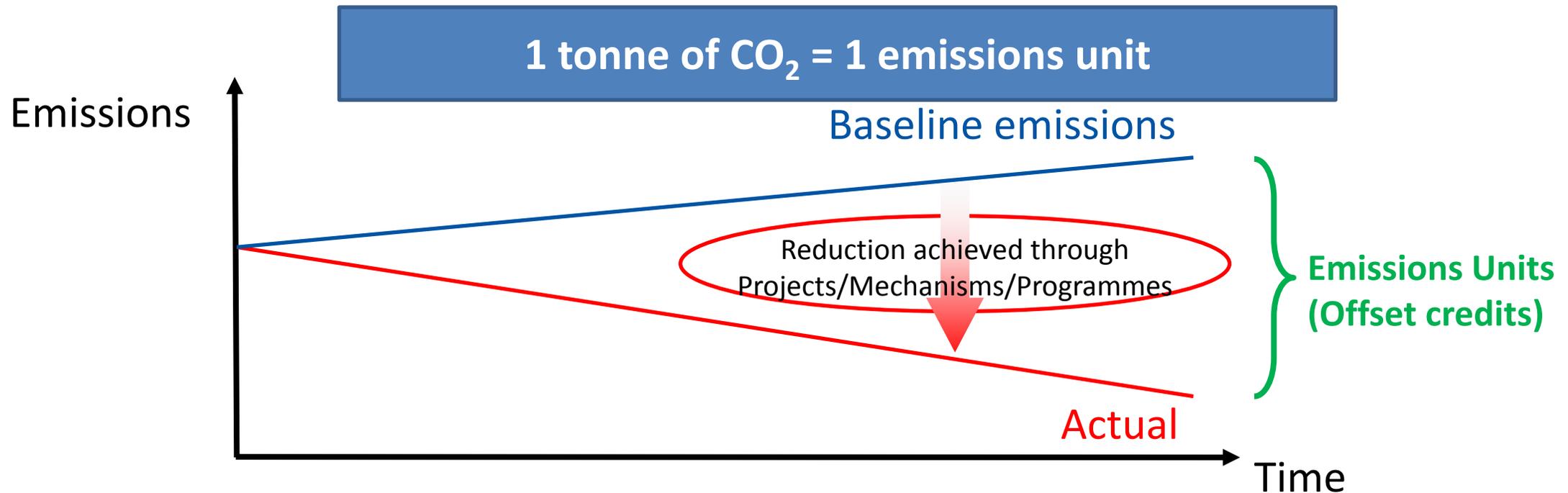
Provides States and operators with procedures how to comply with offsetting requirements by cancelling eligible emissions units, specifically:

- Cancelling CORSIA Eligible Emissions Units (paragraph 4.2)
 - Reporting Emissions Unit Cancellation (paragraph 4.3)
 - Verification of Emissions Unit Cancellation Report (paragraph 4.4)
-
- *Note:* Appendix 1 additionally provides administration procedures relevant to Chapter 4.

Cancelling CORSIA Eligible Emissions Units

What are Emissions Units?

- Arising from emissions reduction achieved by the implementation of projects elsewhere (various sectors – including domestic aviation);
- Issued by crediting schemes through mechanisms, programmes, projects;
- Calculation of the difference between baseline emissions (in the absence of the project activity) and actual emissions (after the project is implemented).



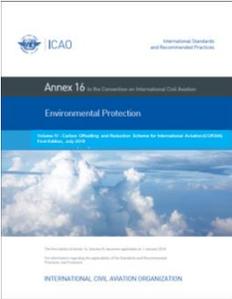
Cancelling CORSIA Eligible Emissions Units

What are Carbon Markets?

- Emissions reduction projects generate emissions units that are sold in carbon markets on a per-tonne basis;
- Owners of emissions units can cancel these units to offset emissions;
- There are different types of carbon markets: compliance markets and voluntary markets;
- Buying and selling of units affect prices of emissions units.

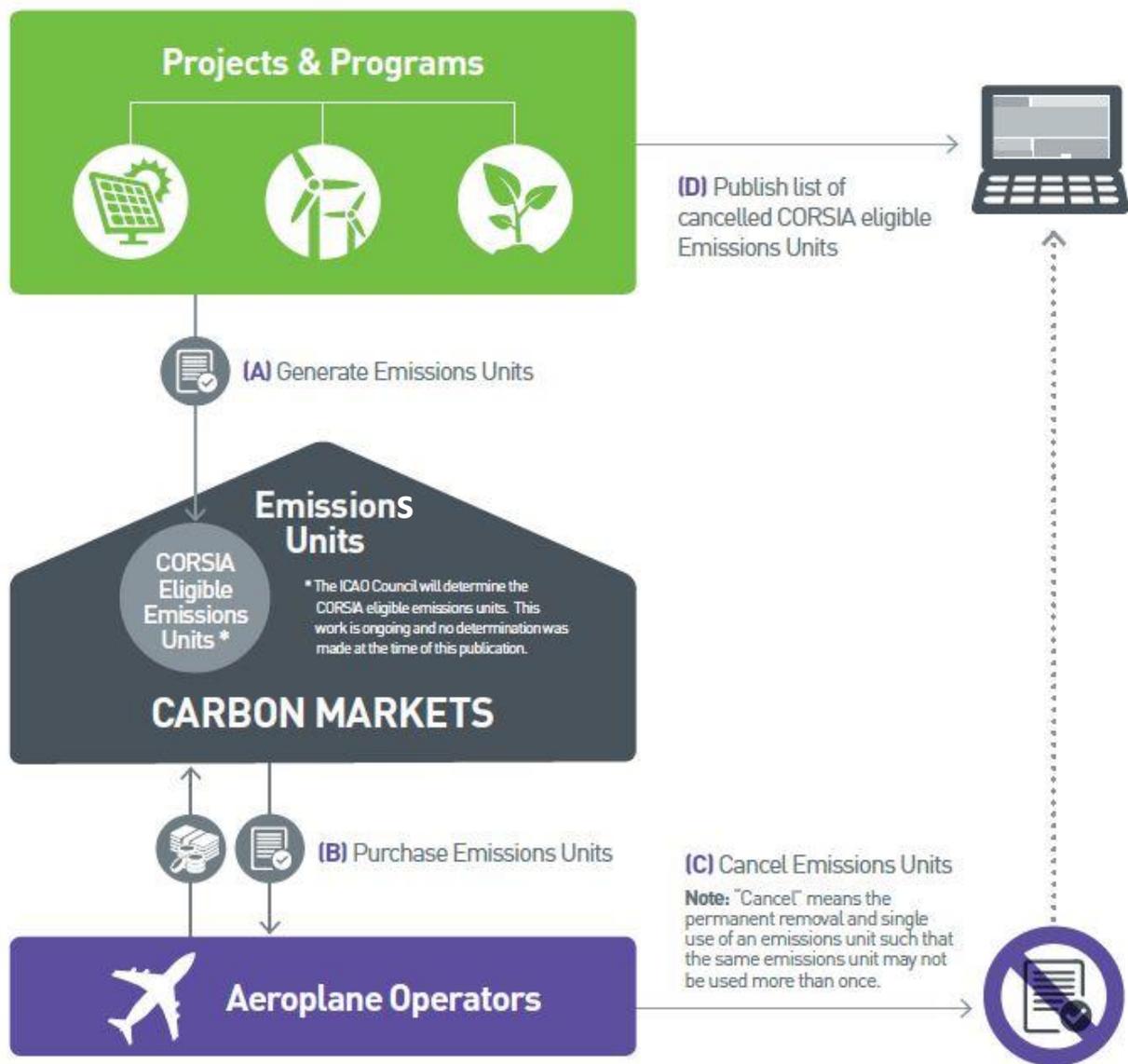


ICAO Seminar on Carbon Markets in February 2018 for further information:
<https://www.icao.int/Meetings/carbonmarkets/Pages/default.aspx>

- Draft Annex 16 Vol. IV – Part II Chapter 4, paragraph 4.2
 - The operator shall meet its final offsetting requirements for a given compliance period by cancelling CORSIA Eligible Emissions Units* within a CORSIA Eligible Emissions Unit Program registry;
- 
- Note:* “Cancel” means the permanent removal and single use of an CORSIA Eligible Emissions Unit within a CORSIA Eligible Emissions Unit Program designated registry such that the same emissions unit may not be used more than once.
- Request each program registry to make visible on the public website, information on each of the operator’s cancelled CORSIA Eligible Emissions Units.
- Draft ICAO CORSIA Implementation Elements
 - One of the Implementation Elements "CORSIA Eligible Emissions Units" will provide information on approved CORSIA Eligible Emissions Units and Emissions Units Criteria.

***The ICAO Council will determine the CORSIA eligible emissions units.**

Cancelling CORSIA Eligible Emissions Units Carbon Markets and the CORSIA



- A. Generate:** Emissions reduction projects generate emissions units.
- B. Purchase:** Emissions units are purchased in carbon markets on a per-tonne basis, where 1 Emissions Unit = 1 Tonne of CO₂.
- C. Cancel:** Operators cancel CORSIA eligible emissions units. Cancellation takes place within a registry designated by a CORSIA Eligible Emissions Unit Program.
- D. Publish:** Operators request each CORSIA Eligible Emissions Unit Program Registry to make visible the cancellation information on the registry's public website.

The ICAO Council will determine the CORSIA eligible emissions units.

- Draft Annex 16 Vol. IV – Part II Chapter 4, paragraph 4.3 and Appendix 5

- For a given compliance period, operator shall report to the State the cancellation of CORSIA Eligible Emissions Units by submitting an Emissions Unit Cancellation Report. (Appendix 5, Table A5-7);

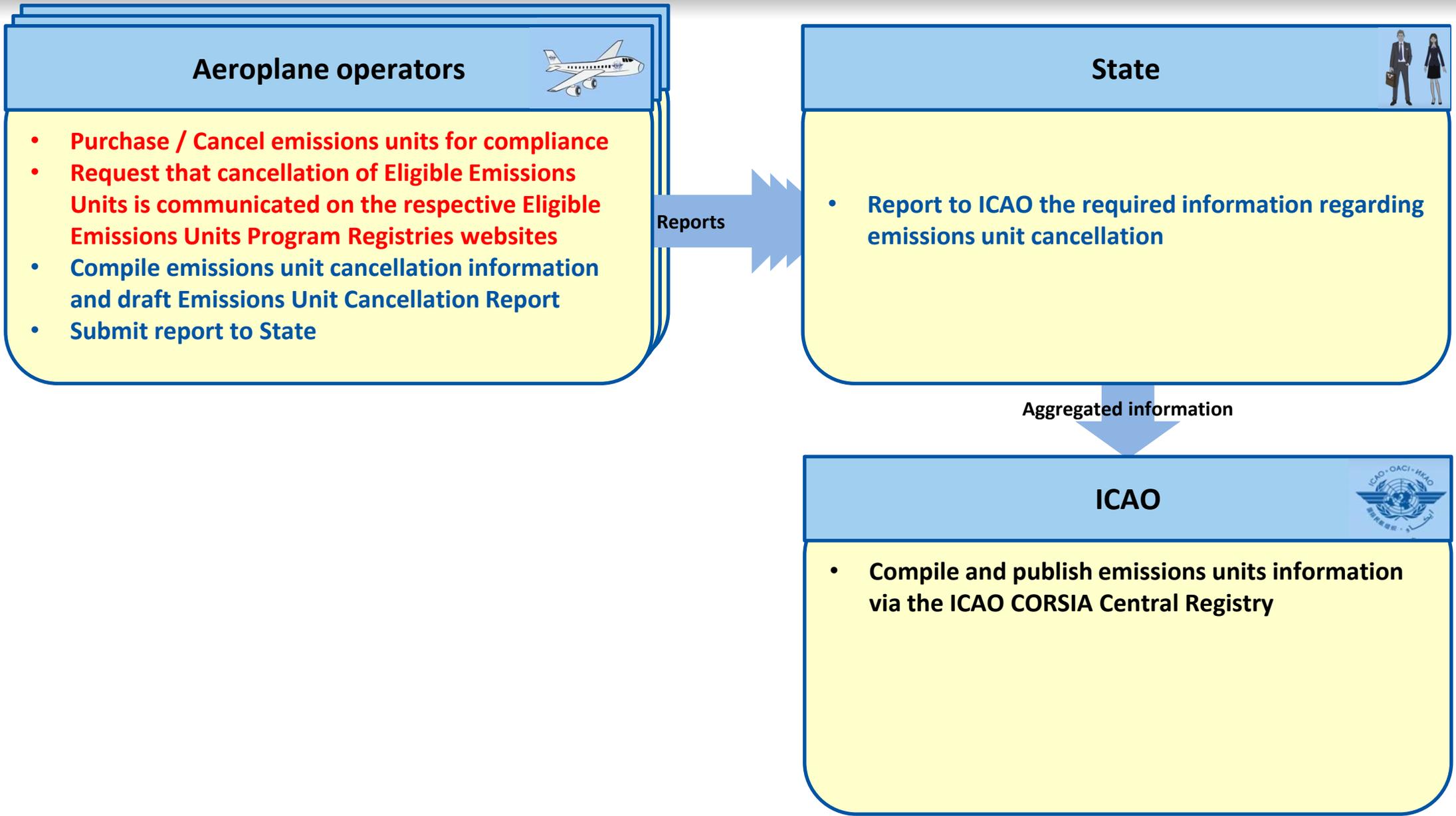
- State shall approve the Emissions Unit Cancellation Report and submit to ICAO. (Appendix 5, Table A5-8)



Field #	Data Field	Details
Field 1	Aeroplane Operator information	1.a Name of Aeroplane Operator 1.b Detailed contact information of Aeroplane Operator 1.c Name of a point of contact 1.d Unique identifier by which an Aeroplane Operator is attributed to a State, in accordance with Chapter 2, 1.2.4 1.e State
Field 2	Compliance period years reported	2. Year(s) in the reported compliance period for which offsetting requirements are reconciled in this report
Field 3	Aeroplane Operator's total final offsetting requirements	3. Aeroplane Operator's total final offsetting requirements (in tonnes), as informed by the State
Field 4	Total quantity of emissions units cancelled	4. Total quantity of emissions units cancelled to reconcile the total final offsetting requirements in Field 3
Field 5	Consolidated identifying information for cancelled emissions units	For each batch of cancelled emissions units (<i>batch</i> defined as a contiguous quantity of serialized emissions units), identify the following: 5.a Quantity of emissions units cancelled; 5.b Start of serial numbers; 5.c End of serial numbers; 5.d Date of cancellation; 5.e Eligible emissions unit program; 5.f Unit type; 5.g Host country; 5.h Methodology ⁷ ; 5.i Demonstration of unit date eligibility; 5.j Program-designated registry name; 5.k Unique identifier for registry account to which the batch was cancelled; 5.l Aeroplane Operator in whose name the unit was cancelled; and 5.m The unique identifier for the registry account from which the cancellation was initiated.

Table A5-7. Emissions Unit Cancellation Report from operator to State © ICAO 2018

Reporting Emissions Unit Cancellation



Cancel
Report

- Recap: Reporting in CORSIA

- Reporting of CO₂ Emissions

(Draft Annex 16, Volume IV, Part II, Chapter 2, paragraph 2.3)

Covered in session #3



- Reporting emissions units cancellation

(Draft Annex 16, Volume IV, Part II, Chapter 4, paragraph 4.3)

Covered in this session #5

- Verification is an essential part of the CORSIA, as it ensures the accuracy of the information related to:

- The amount of CO₂ emissions from international flights

(Draft Annex 16, Volume IV, Part II, Chapter 2, paragraph 2.4)

Covered in session #3



- The purchase of emissions units from eligible programmes to address offsetting requirements
- The cancellation of eligible emissions units
- The confirmation of the single use of eligible emissions units

(Draft Annex 16, Volume IV, Part II, Chapter 2, paragraph 2.4)

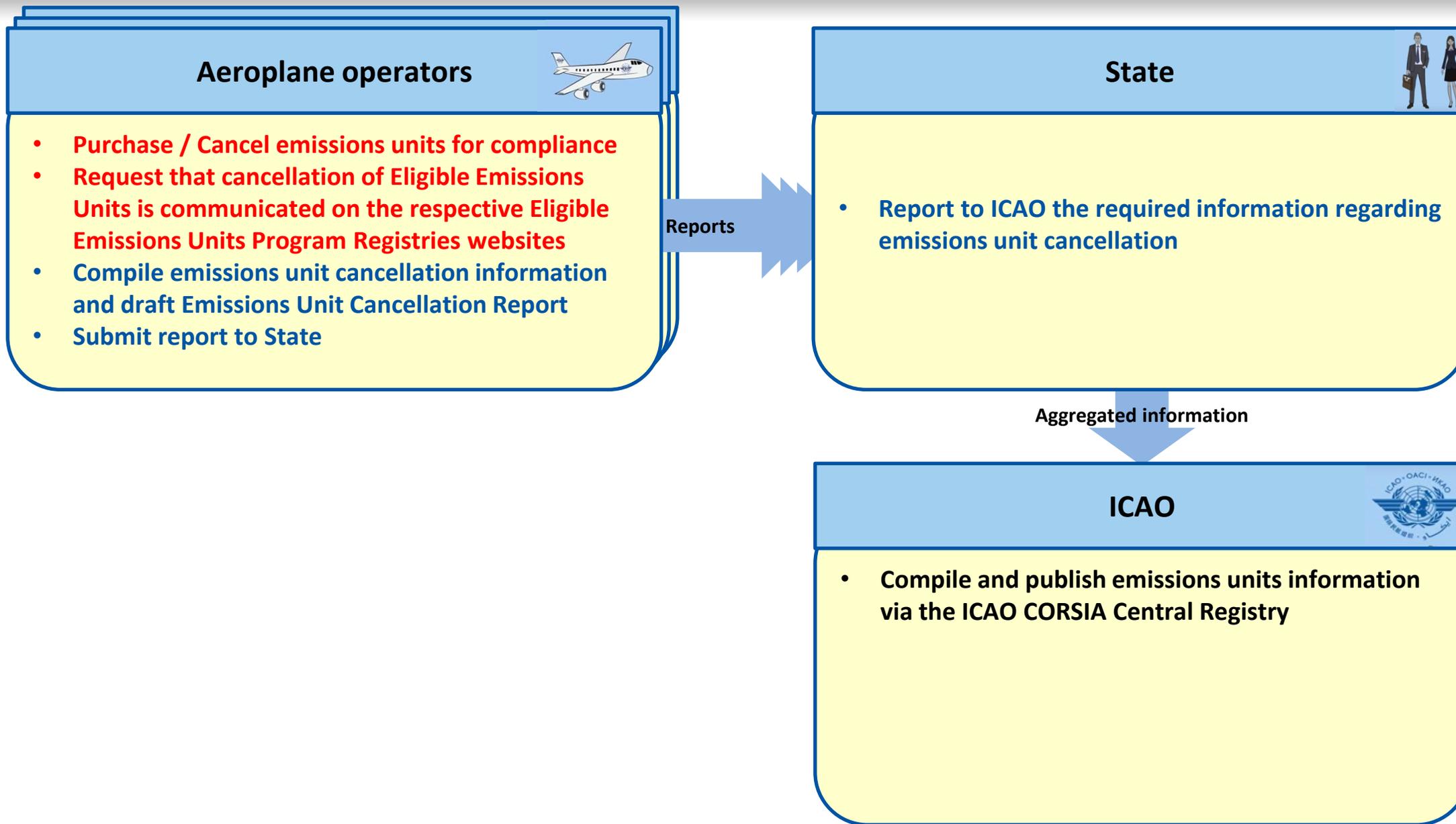
Covered in this session #5

- Draft Annex 16 Vol. IV – Part II Chapter 4, paragraph 4.4 and Appendix 6

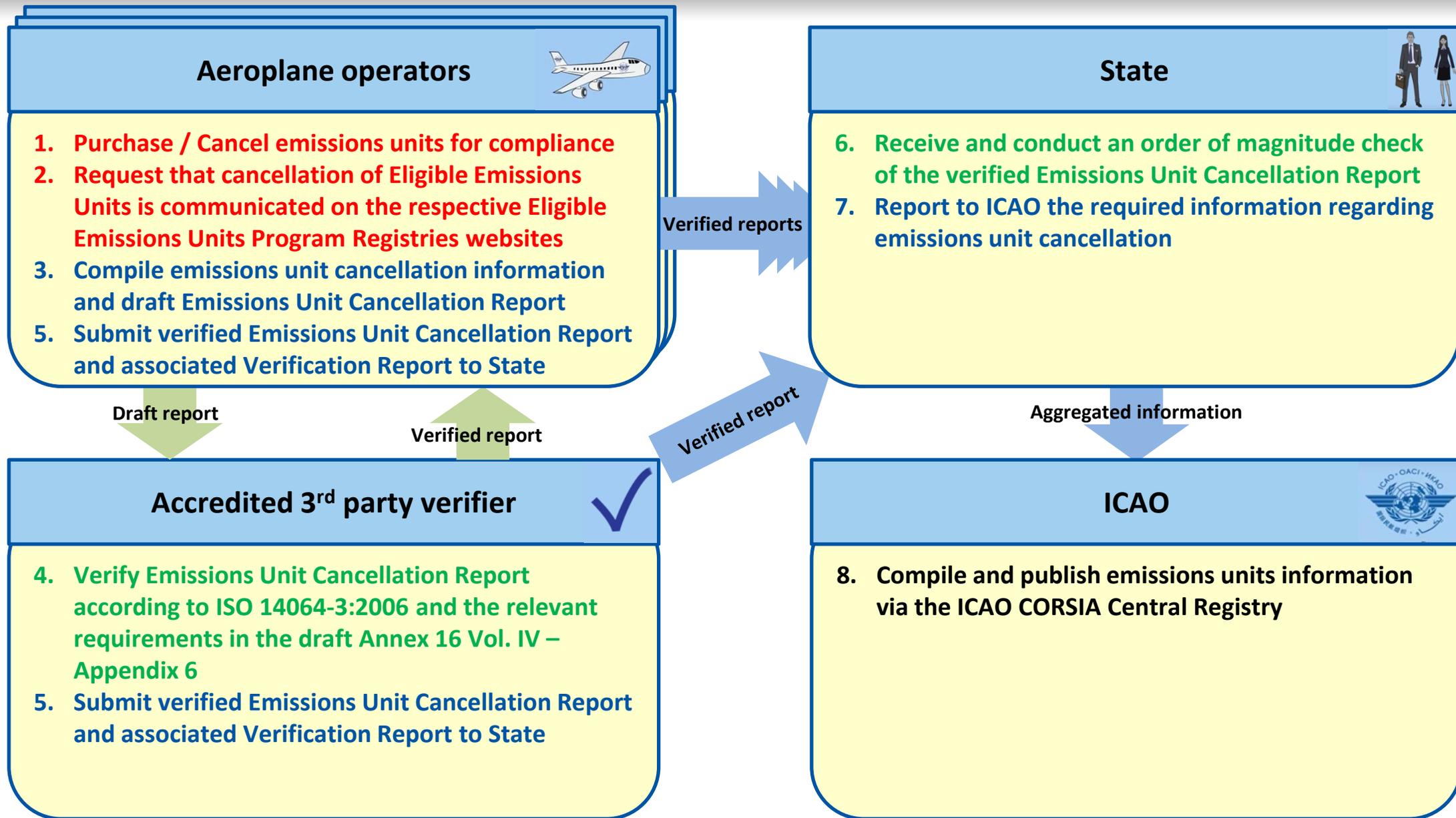


- The operator shall engage a verification body for the verification of its Emissions Unit Cancellation Report;
- Verification body shall conduct the verification according to ISO 14064-3:2006, and the relevant requirements in Appendix 6;
- Submission of Emissions Unit Cancellation Report and Verification Report to State by aeroplane operator and verification body;
- State shall perform an order of magnitude check of the Emissions Unit Cancellation Report.
- Verification body shall be accredited to ISO 14065:2013 and the relevant requirements in Appendix 6 by a national accreditation body.

Verification of Emissions Unit Cancellation Report



Verification of Emissions Unit Cancellation Report



Cancel
Report
Verify



Summary

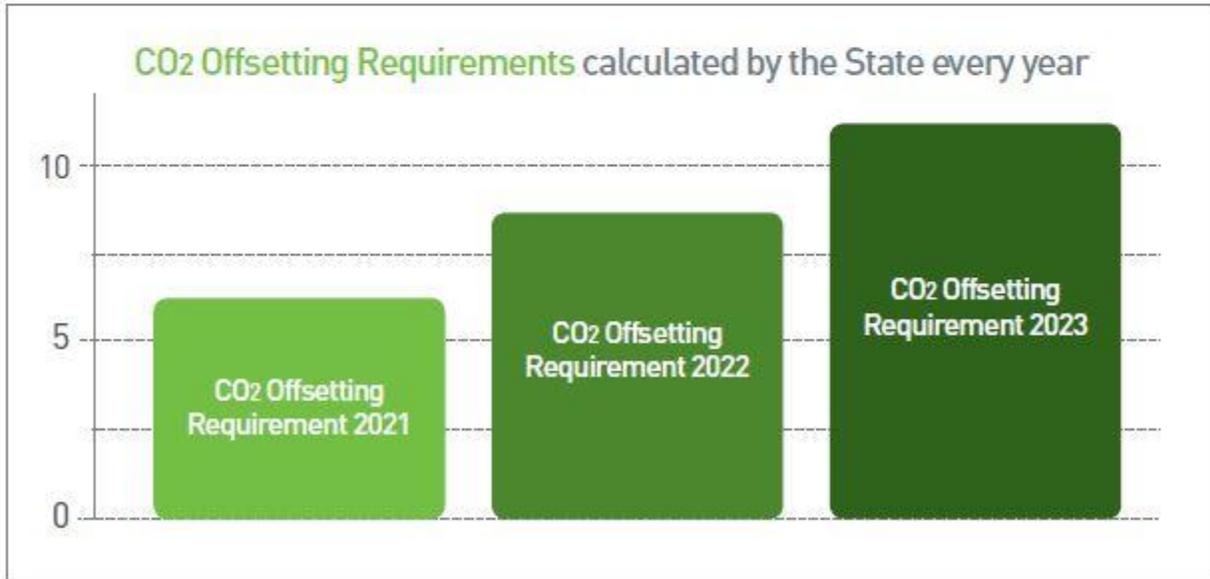


1 The State calculates the offsetting requirements attributed to an aeroplane operator.

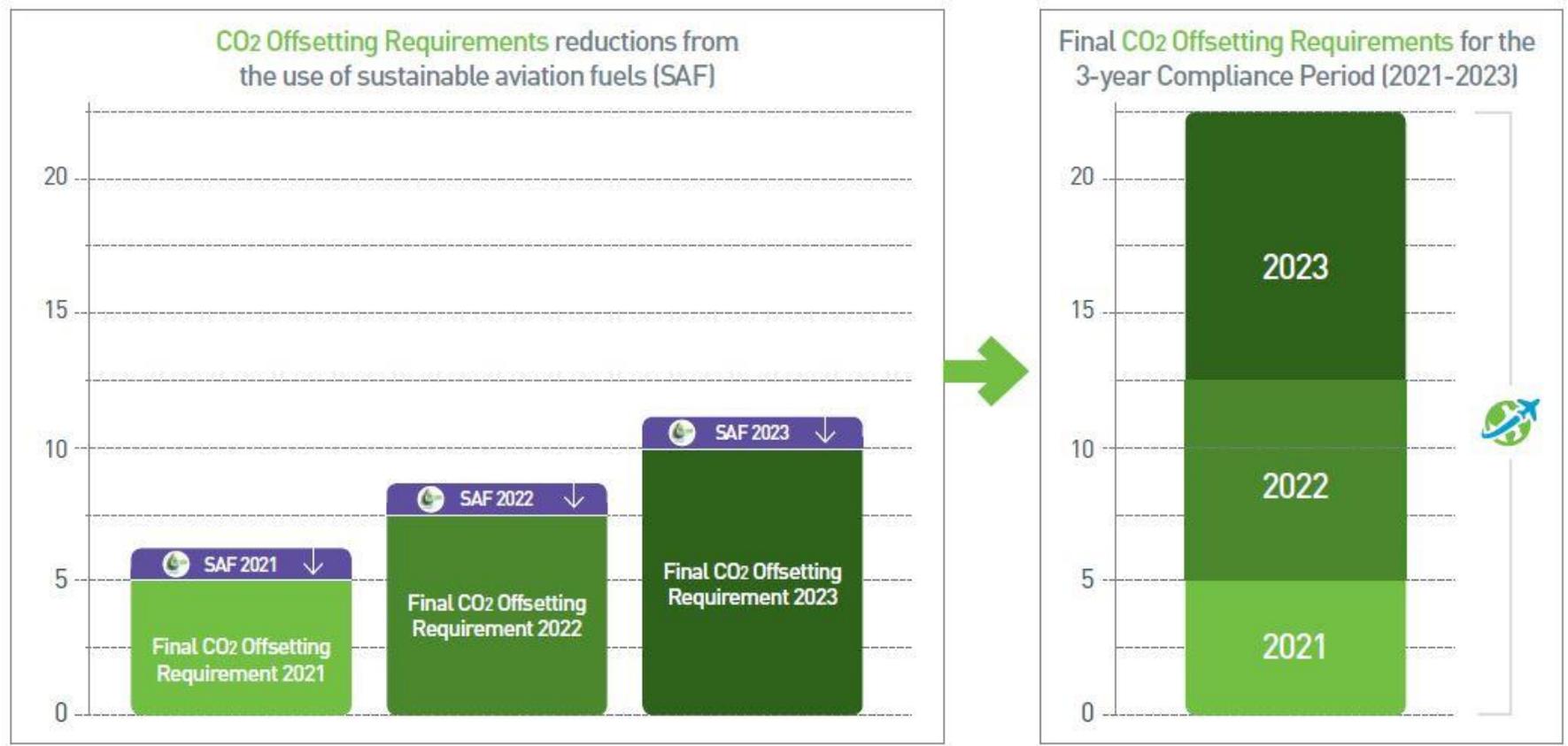
$$\text{Operator's annual emissions} \times \text{Growth Factor} = \text{CO}_2 \text{ offset requirements}$$

In a given year from 2021, the **Growth Factor** is the percent increase in the amount of emissions from the baseline, and is calculated by ICAO.

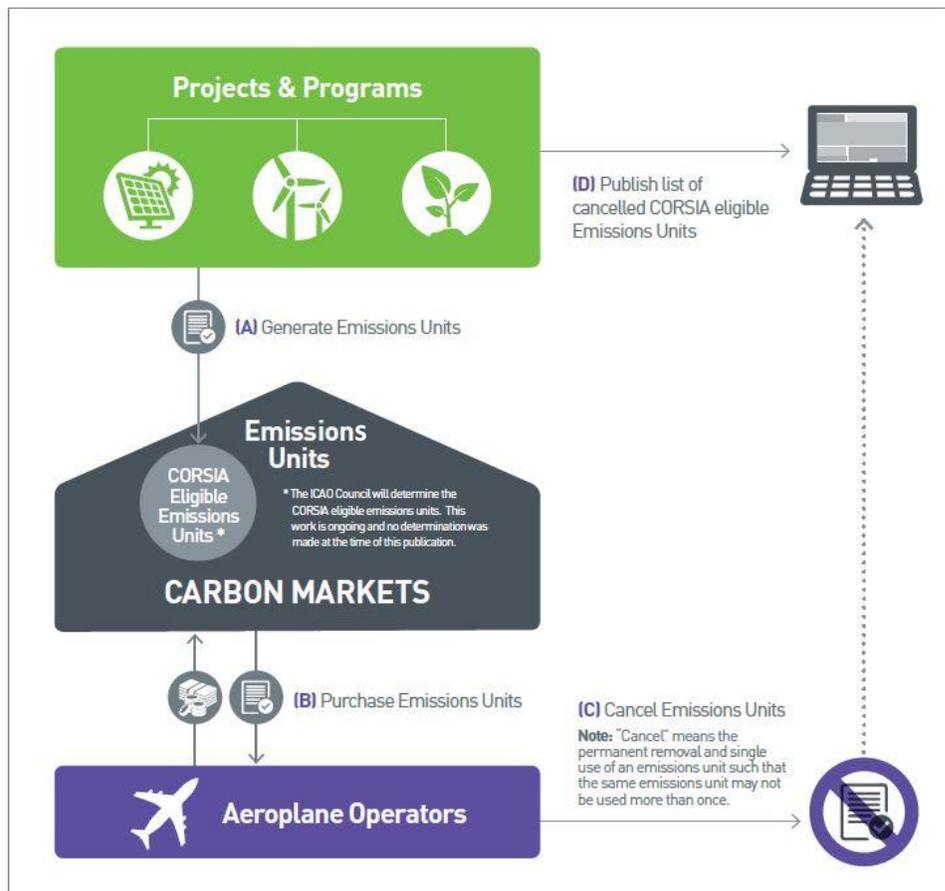
The **Growth Factor** changes every year taking into account both the sector's and the individual operator's emissions growth.



- 2 The operator reports the use of sustainable aviation fuels (SAF) for a 3-year compliance period.
- 3 The State accounts for the benefits from the use of SAF and informs the operator of its final CO₂ offsetting requirements for a 3-year compliance period.



4 The operator purchases and cancels eligible emissions units equivalent to its final CO₂ offsetting requirements for the compliance period.



- A. **Generate:** Projects generate emissions units.
- B. **Purchase:** Emissions units are purchased in carbon markets by aeroplane operators.
- C. **Cancel:** Operators cancel CORSIA eligible emissions units within a registry designated by a CORSIA Eligible Emissions Unit Program.
- D. **Publish:** Operators request each CORSIA Eligible Emissions Unit Program Registry to make visible the cancellation information on the registry's public website.

5 The operator provides a verified Emissions Units Cancellation Report to the State, who checks the Report and informs ICAO.

1

The State calculates the offsetting requirements attributed to an aeroplane operator.

2

The operator reports the use of sustainable aviation fuels (SAF) for a 3-year compliance period.

3

The State accounts for the benefits from the use of SAF and informs the operator of its final CO₂ offsetting requirements for a 3-year compliance period.

4

The operator purchases and cancels eligible emissions units equivalent to its final CO₂ offsetting requirements for the compliance period.

5

The operator provides a verified Emissions Units Cancellation Report to the State, who checks the Report and informs ICAO.

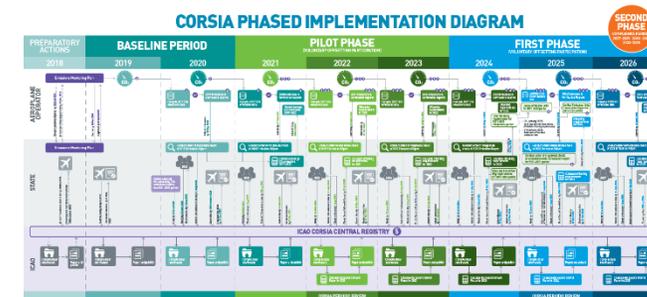
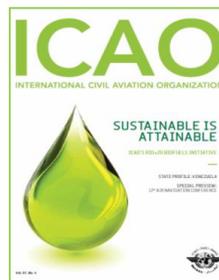
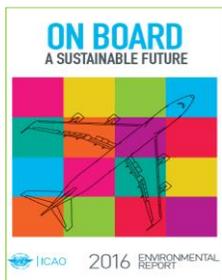


Questions?



Practical Demonstration

CORSIA Offsetting Requirements



For more information, please visit our website: <http://www.icao.int/env>