



| ICAO

# INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY





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ENVIRONMENT

# 41st ICAO Assembly Outcome and Follow-up Actions by ICAO



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**Environment Officers, ICAO, ESAF, WACAF**



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## Vision

Achieve the sustainable growth of the global civil aviation system

## Mission

To serve as the global forum of States for international civil aviation

## ICAO Strategic Objectives



## Assembly 41<sup>st</sup> Session

33 Resolutions adopted by the ICAO Assembly



# ICAO STRATEGIC OBJECTIVE

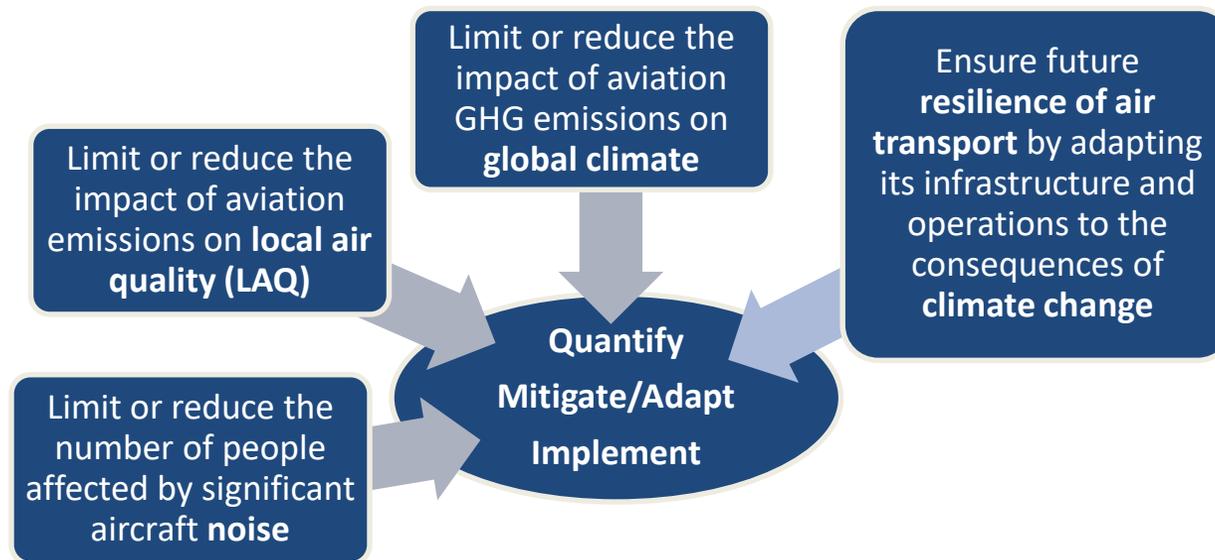
Minimize the adverse effect of global civil aviation on the environment



ICAO's environmental work contributes to 14 out of the 17 United Nations SDGs



# ICAO ENVIRONMENTAL GOALS

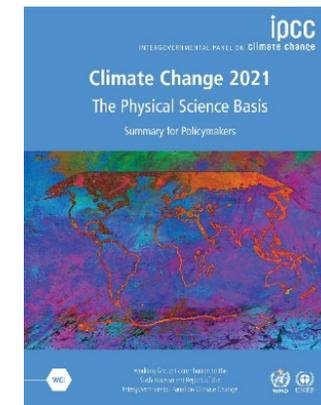
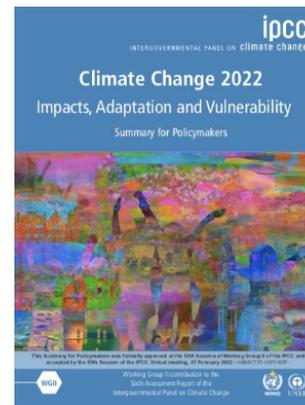
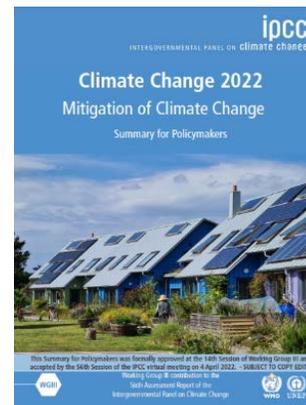


## 41<sup>st</sup> ASSEMBLY RESOLUTIONS

- **A41-20:** General provisions, noise and local air quality
- **A41-21:** Climate change
- **A41-21:** Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

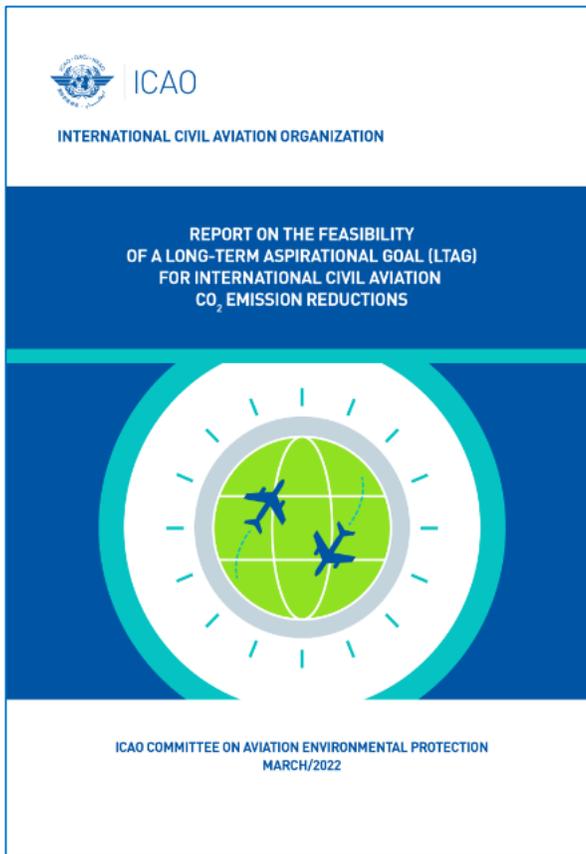


## Aviation Contributes to Climate Change - IPCC Report



## Resolution A41-21, operative paragraph 7:

*Further resolves* that, in addition to the medium-term global aspirational goal in paragraph 6 above, **ICAO and its Member States are encouraged to work together to strive to achieve a collective long-term global aspirational goal for international aviation (LTAG) of net-zero carbon emissions by 2050**, in support of the Paris Agreement’s temperature goal, recognizing that each State’s special circumstances and respective capabilities (e.g., the level of development, maturity of aviation markets, sustainable growth of its international aviation, just transition, and national priorities of air transport development) will inform the ability of each State to contribute to the LTAG within its own national timeframe;



### LTAG Report

#### LTAG Report Appendixes (English only)



Appendix B1  
Background  
(18 pages)



Appendix R1  
Summary Sheets  
(61 pages)



Appendix R2  
Comparison to Trends  
(8 pages)



Appendix R3  
Results in the Climate  
Science Context  
(10 pages)



Appendix S1  
Climate Science Context  
(24 pages)



Appendix M1  
Overview of the Modelling  
Approaches  
(99 pages)



Appendix M2  
COVID-19 Forecast  
Scenario Development  
(8 pages)



Appendix M3  
Technology  
(181 pages)



Appendix M4  
Operations  
(12 pages)



Appendix M5  
Fuels  
(84 pages)

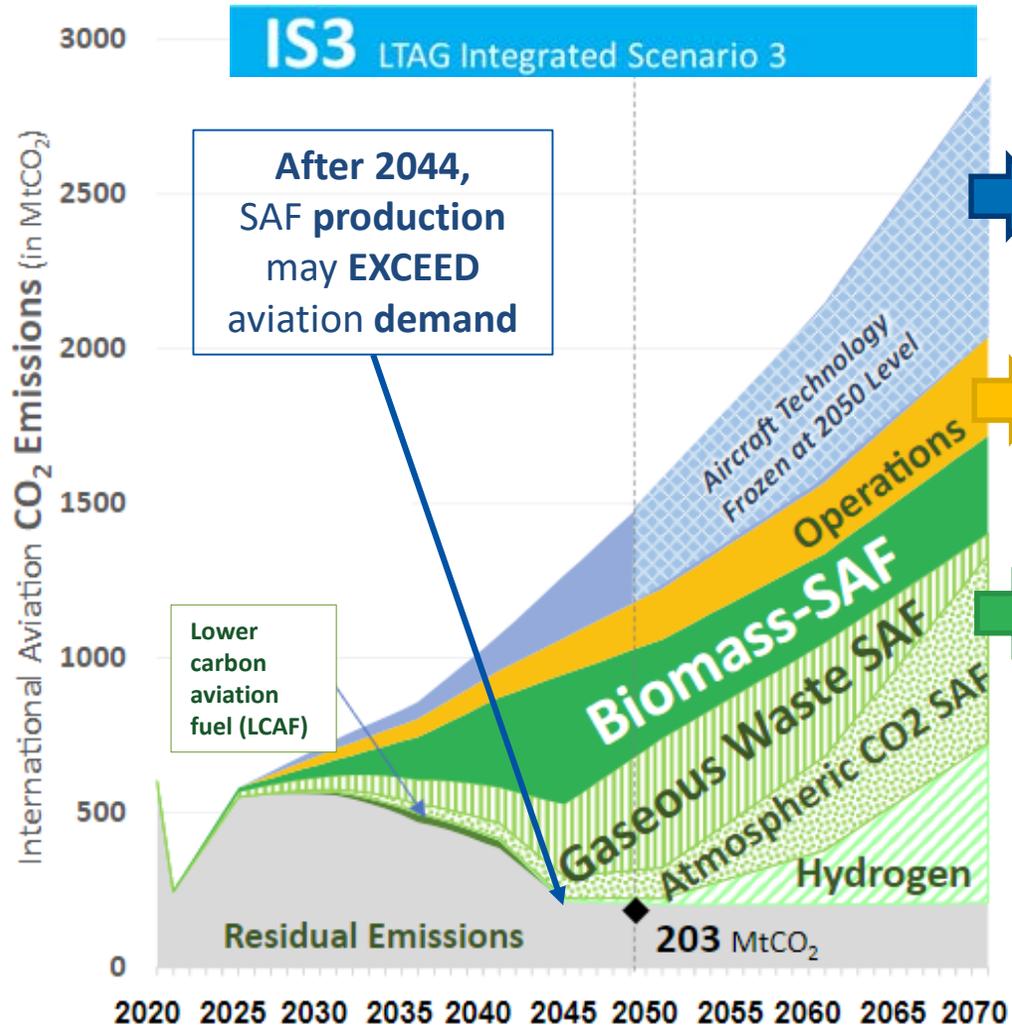
### Appendixes to LTAG Report



### 2022 ICAO Environmental Report Special Supplement on LTAG



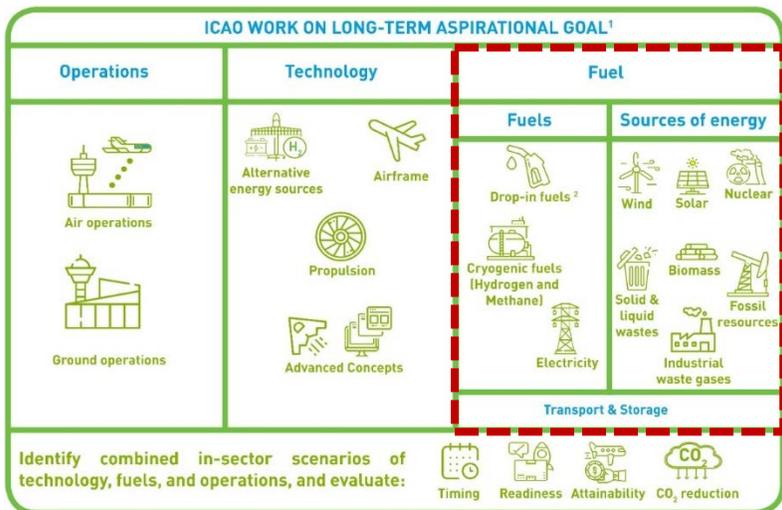
# LTAG REPORT – CONTRIBUTIONS FROM TECHNOLOGY, OPERATIONS, AND FUELS



Advanced tube and wing, unconventional airframe/propulsion concept aircraft, non-drop-in fuels such as battery electric etc.

Improvements in the performance of flights across all phases

Sustainable aviation fuels (SAF) and other cleaner energy have the largest impact on residual CO<sub>2</sub> emissions, driving overall reductions by 2050  
Contributions from hydrogen may increase in the 2050s and 2060s if technically feasible and commercially viable



Fuel Category	Fuel Name	Carbon sources in fuel feedstock
1. LTAG Sustainable Aviation Fuels (LTAG-SAF)	Biomass-based fuel	Primary biomass products and co-products
	Solid/liquid waste-based fuels	By-products, residues, and wastes
	Gaseous waste-based fuels	Waste CO/CO <sub>2</sub>
	Atmospheric CO <sub>2</sub> -based fuels	Atmospheric CO <sub>2</sub>
2. LTAG Lower Carbon Aviation Fuels (LTAG-LCAF)	Lower carbon petroleum fuels	Petroleum
3. Non-drop-in fuels	Cryogenic hydrogen (LH <sub>2</sub> )	Natural gas, by-products, non-carbon sources
	Liquefied gas aviation fuels (ASKT)	Petroleum gas, 'fat' natural gas, flare gas, and propane-butane gases
	Electricity	Not applicable

**Not part of LTAG fuels analyses** – Electrification of aircraft, including hybrid + fully electric airframes considered under LTAG – Tech analysis. ASKT was analyzed as part of case study for applicability in remote areas with stranded hydrogen resources, excluded from subsequent analyses



Flight Distance		Incremental Cost* per Flight	
Illustrative Origin & Destination		(Incremental Cost* per Seat**)	
		in 2030	in 2050
<b>Short</b> Haul Flight  630 km (=10 <sup>th</sup> percentile of int. aviation flights)	Zurich → Amsterdam Switzerland → Netherlands (LSZH) → (EHAM)	<b>\$ 130</b> (\$0.8)	<b>\$ 780</b> (\$4.4)
		<b>\$ 520</b> (\$3.3)	<b>\$ 1600</b> (\$9.2)
		<b>\$ 660</b> (\$4.3)	<b>\$ 2200</b> (\$13)
<b>Average</b> Haul Flight  2700 km (average for international aviation)	Montreal → Denver Canada → U.S. (CYUL) → (KDEN)	<b>\$ 650</b> (\$3)	<b>\$ 3500</b> (\$15)
		<b>\$ 2600</b> (\$12)	<b>\$ 7200</b> (\$31)
		<b>\$ 3300</b> (\$15)	<b>\$ 10,000</b> (\$43)
<b>Long</b> Haul Flight  5800 km (=90 <sup>th</sup> percentile of int. aviation flights)	Singapore → Dubai Singapore → UAE (WSSS) → (OMDB)	<b>\$ 1600</b> (\$5)	<b>\$ 8000</b> (\$25)
		<b>\$ 6600</b> (\$20)	<b>\$ 17,000</b> (\$53)
		<b>\$ 8300</b> (\$26)	<b>\$ 23,000</b> (\$73)

\* Costs in \$ 2020 (adjusted for inflation).

\*\* Seat equivalent including available seats for passenger, equivalent seats for freighters and 13 seats (default) for business jets.

**Under highest ambition scenario, incremental costs from Fuels may represent:**

- Additional \$3,300 in 2030
- Additional \$10,000 in 2050

(Average haul flight – 2,700km)

**This represents about \$15 - \$43 on a per seat basis**



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# ICAO'S ASSISTANCE, CAPACITY BUILDING, AND TRAINING PROGRAMME FOR SUSTAINABLE AVIATION FUELS



# ACT SAF

HELPING COUNTRIES TAKE ACTION ON THE DEVELOPMENT AND DEPLOYMENT OF SUSTAINABLE AVIATION FUELS



Launched on 1 June 2022, in an event Associated to the Stockholm+50 Conference



As of May 2023, 75 States and 39 Organizations joined as ACT-SAF Partners: Training Series, Feasibility Studies, Template for Feasibility Studies, Outreach of Initiatives from ACT-SAF Partners, etc.



1) Interested party expresses interest in becoming an ACT-SAF Partner

2) ICAO deploys ACT-SAF activities based on States tailored needs and capabilities

3) ICAO connects ACT-SAF Participants

4) ICAO facilitates agreements and coordinates concrete SAF projects

### Deployment of ACT-SAF activities

- Coordination calls with States to assess needs and offers
- **ACT-SAF Series** on a monthly basis
- Preparations to launch **feasibility studies**
- Development of ICAO **template for feasibility studies**
- Inception of **ICAO SAF Monitoring and Accounting platform**

### Connection with financing institutions

Regional workshops & meetings with banks  
Identification of financial tools relevant for SAF

### Ongoing

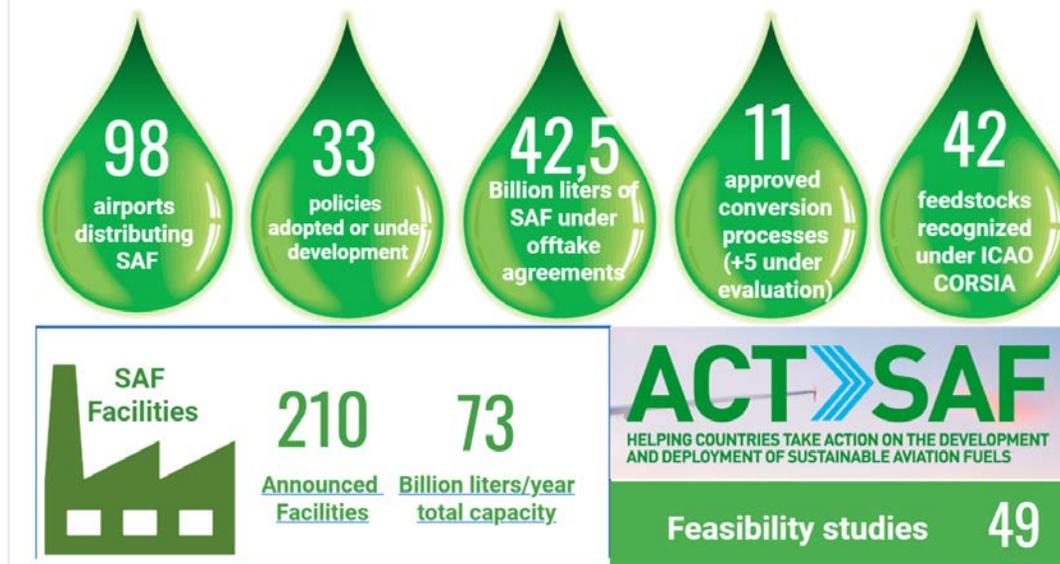
**Facilitate** the matching of needs and opportunities between States and industry

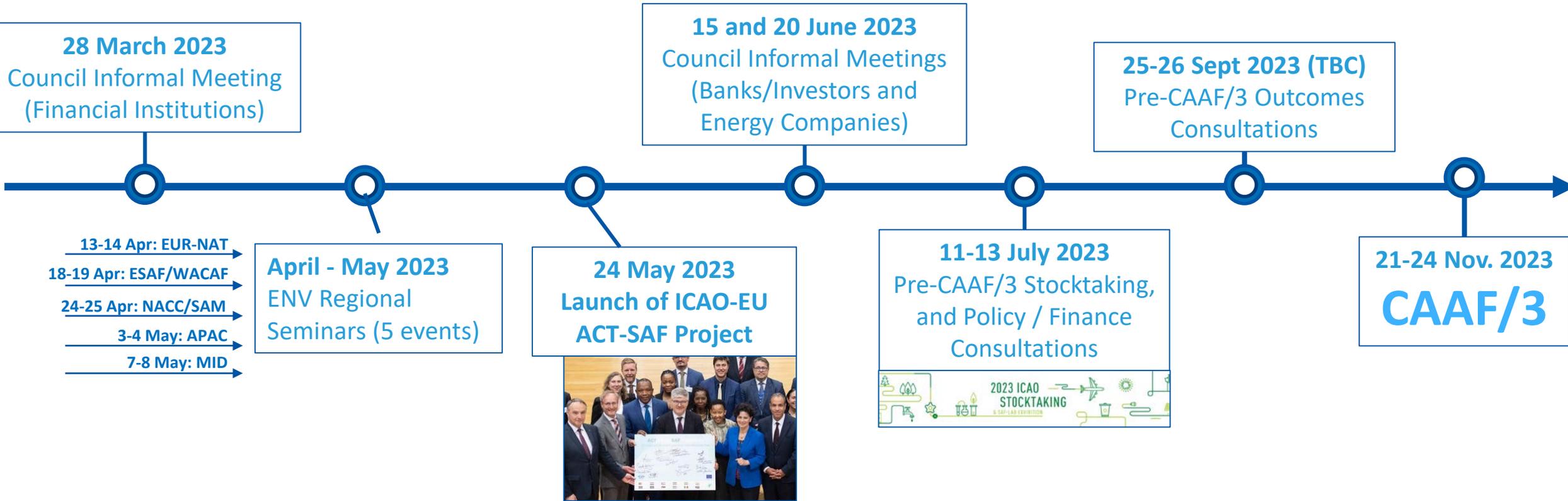




- ICAO is constantly monitoring SAF development through the SAF trackers
- Coming soon – new tracker on capacity building initiatives, including ACT-SAF Projects

SAF Tracking tools (click on the drops for details)







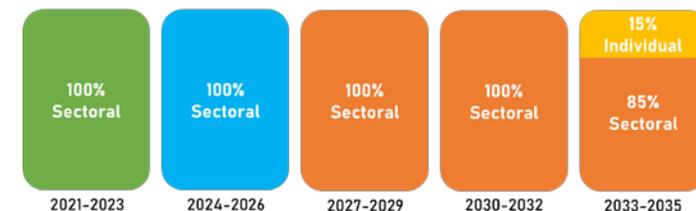
Based on the recommendations by the ICAO Council from the 2022 CORSIA review, the 41st Session of the ICAO Assembly adopted:

– Adjustments to CORSIA baseline emissions:

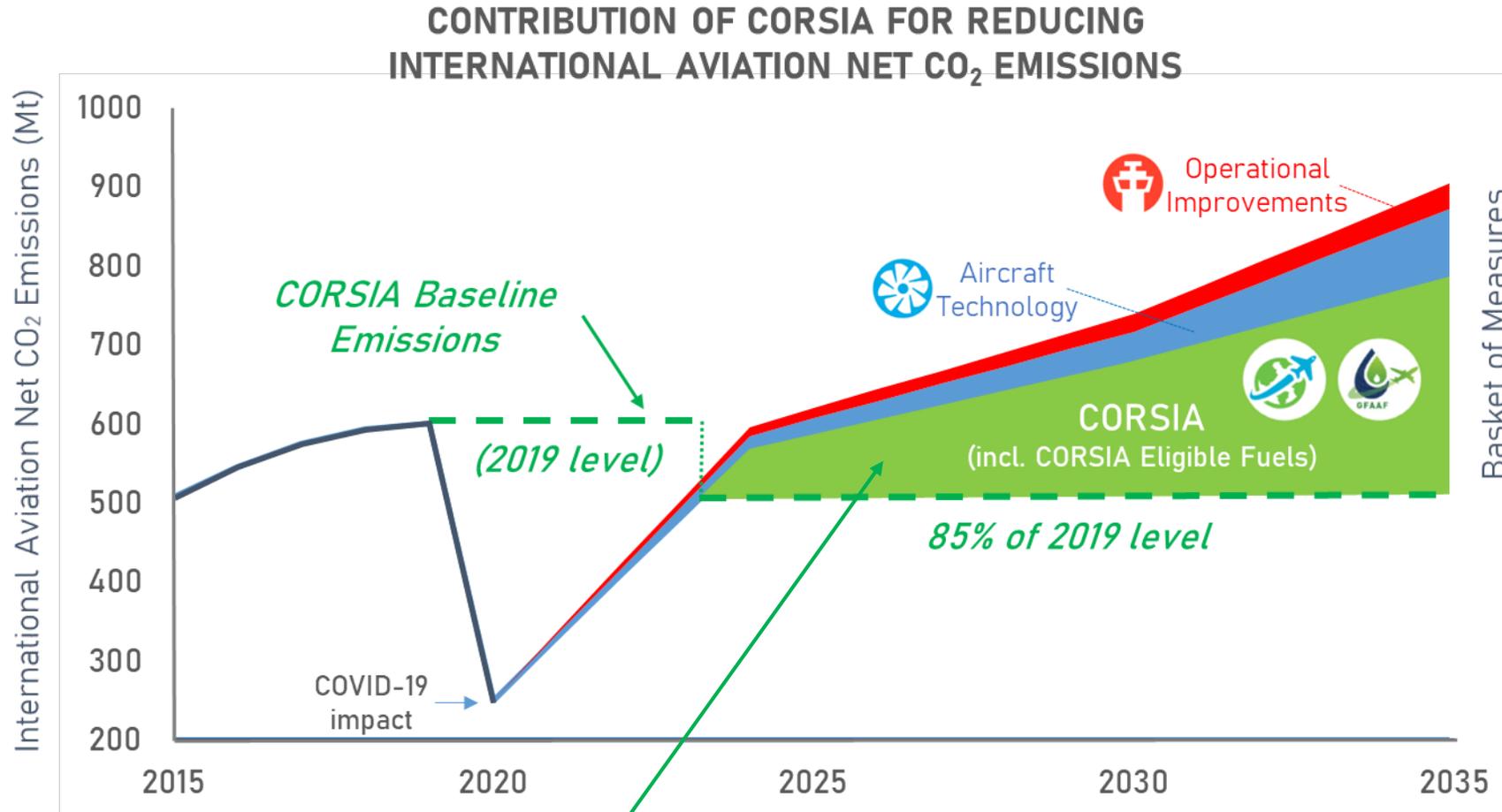
- For pilot phase (2021 – 2023): 2019 CO<sub>2</sub> emissions (*as per Council decision in June 2020*)
- From 2024 onwards: 85% of 2019 CO<sub>2</sub> emissions

– Changes to the percentage use of sectoral and individual operator's growth factors for the calculation of CORSIA offsetting requirements:

- 100% sectoral and 0 % individual for 2021 – 2032
- 85 % sectoral and 15% individual for 2033 – 2035



– Use of 2019 emissions to determine new entrants



**CORSIA addresses the remaining “emissions gap” to achieve Carbon Neutral Growth 2020**

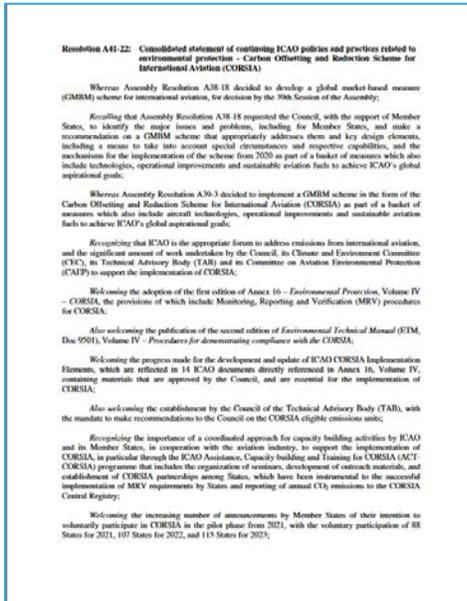


- Periodic review of CORSIA every three years – **First 2022 review was completed prior to A41**
- Allows the Council to make informed decisions on whether it is necessary to make adjustments to the next phase(s) of the scheme
- Special review by end of 2032 on termination of the scheme, its extension or any other improvements of the scheme beyond 2035
- At the request of A41, the Council to develop a methodology and timeline for future reviews

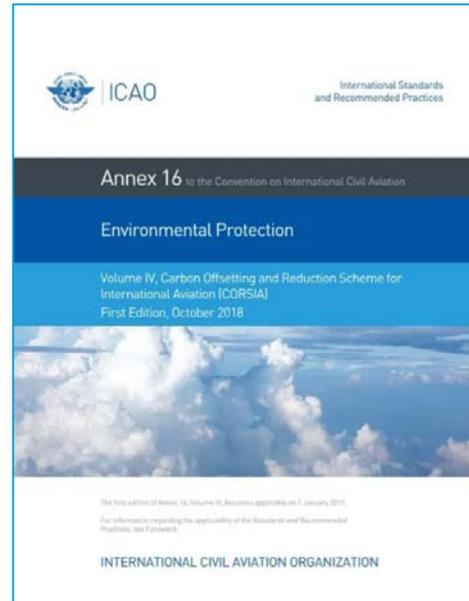




## Assembly Resolution A41-22



## Annex 16, Volume IV (1<sup>st</sup> edition)



*2<sup>nd</sup> edition to become applicable from 1/1/2024 (to be published in the second part of 2023)*

## Doc 9501 (ETM), Vol. IV (CORSIA) (2<sup>nd</sup> edition)



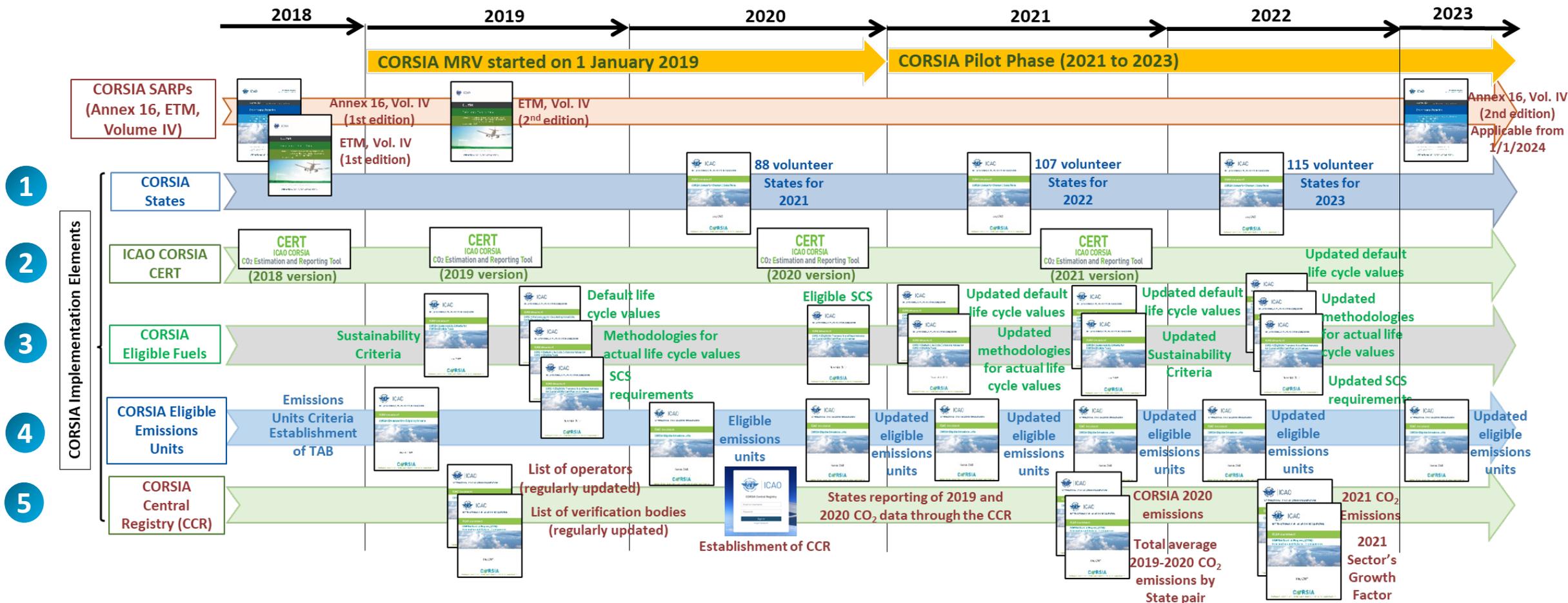
*3<sup>rd</sup> edition (to be published in the second part of 2023)*

## CORSIA Implementation Elements and ICAO CORSIA documents

CORSIA Implementation Elements referenced in Annex 16, Volume IV				
1 CORSIA States for Chapter 3 State Pairs	2 CORSIA CO <sub>2</sub> Estimation and Reporting Tool	3 CORSIA Eligible Fuels	4 CORSIA Eligible Emissions Units	5 CORSIA Central Registry



*Regularly updated*





## CORSIA Participation

**121**  
Volunteer States

## CORSIA Eligible Emissions Units

**9**  
Eligible Emissions Units Programs<sup>1</sup>

## CORSIA Eligible Fuels

**43**  
Feedstock Types

**9**  
Conversion Processes

**14**  
Sustainability Themes<sup>2</sup>

**2**  
Sustainability Certification Schemes<sup>1</sup>

## CORSIA Central Registry

**608**  
Mtonnes of 2019 CO<sub>2</sub> Emissions<sup>3</sup>

**289**  
Mtonnes of 2021 CO<sub>2</sub> Emissions<sup>3</sup>

**625**  
Aeroplane Operators

**54**  
Verification Bodies

<sup>1</sup> For the Pilot phase (2021-2023)

<sup>2</sup> From 2024 onwards (2 Sustainability Themes applicable for the Pilot phase)

<sup>3</sup> Totals include CO<sub>2</sub> emissions submitted by States through the CCR and emissions provided by ICAO to fill the emissions gaps



Different phases with specific focus areas in order to support necessary actions by States with different timelines, under ICAO Coordinate Approach

**Phase I (Sep 2018 – Apr 2019): 15 supporting States and 98 requesting States**

- Development and approval of Emissions Monitoring Plans
- Establishment of national/regional regulatory frameworks

**Phase II (May 2019 – Apr 2020): 16 supporting States and 114 requesting States**

- CO<sub>2</sub> Emissions reporting and verification

**Phase III (Apr 2020 - 2023): 17 supporting States and 119 requesting States**

- Use of the CORSIA Central Registry (CCR)

**Measure of success:** more than 96% of global CORSIA CO<sub>2</sub> emissions having been submitted annually by States through the CORSIA Central Registry (CCR) for the period 2019-2021

ACT-CORSIA Assistance, Capacity-building and Training on CORSIA	
<b>AUSTRALIA</b>	<b>KENYA / UNITED KINGDOM</b>
1. BRUNEI DARUSSALAM	1. ETHIOPIA
2. INDONESIA	2. RWANDA
3. NAURU	3. SEYCHELLES
4. PAPUA NEW GUINEA	4. SOUTH SUDAN
5. SRI LANKA	5. UGANDA
6. THAILAND	6. UNITED REPUBLIC OF TANZANIA
<b>BRAZIL</b>	<b>NEW ZEALAND</b>
1. ANGOLA	1. ELU
2. CARGO VERDE	2. SAMOA
3. HOLLANDS	3. SOLOMON ISLANDS
4. SAO TOME AND PRINCIPE	4. VANUATU
<b>CANADA (Facilitated by CANSIB)</b>	<b>NIGERIA</b>
1. ANTIQUA AND BARBUDA	1. GAMBIA
2. BARBADOS	2. GHANA
3. BAHAMA	3. LIBERIA
4. HAITI	4. LIBERIA LEONE
5. JAMAICA	5. SUDAN
6. SURINAME	<b>REPUBLIC OF KOREA</b>
7. TRINIDAD AND TOBAGO	1. LAO PEOPLE'S D. R.
<b>CANADA / FRANCE</b>	2. MONGOLIA
1. BENIN	3. PAKISTAN
2. BURKINA FASO	4. PHILIPPINES
3. BURUNDI	5. VIETNAM
4. CAMEROON	<b>QATAR</b>
5. CENTRAL AFRICAN REPUBLIC	1. BARBAIN
6. CHAD	2. BAH
7. COMOROS	3. IRAQ
8. CONGO	4. JORDAN
9. CÔTE D'IVOIRE	5. JORDAN
10. EMBOUTI	6. LIBYA
11. D. R. OF CONGO	7. OMAN
12. GABON	<b>SINGAPORE</b>
13. GUINEA	1. COOK ISLANDS
14. MADAGASCAR	2. KIRIBATI
15. MALI	3. MARSHALL ISLANDS
16. MAURITANIA	4. PALAU
17. MALDIVES	5. TONGA
18. NIGER	6. TUNALI
19. SENEGAL	<b>SOUTH AFRICA</b>
20. TOGO	1. BOTSWANA
<b>FRANCE (Facilitated by ACAS)</b>	2. EDWATINI
1. ALGERIA	3. LESOTHO
2. MOROCCO	4. MALAWI
3. TUNISIA	5. NAMIBIA
<b>GERMANY</b>	6. ZAMBIA
1. ALBANIA	7. ZIMBABWE
2. ARMENIA	<b>SPAIN (Facilitated by COSIMA)</b>
3. AZERBAIJAN	1. BELIZE *
4. BELARUS	2. BOLIVIA
5. GEORGIA	3. COLOMBIA
6. KAZAKHSTAN	4. COSTA RICA *
7. NORTH MACEDONIA	5. CUBA
8. REPUBLIC OF MOLDOVA	6. EL SALVADOR *
9. SAUDI ARABIA	7. EQUATORIAL GUINEA
10. SERBIA	8. GUATEMALA *
11. TAJIKISTAN	9. HONDURAS *
12. TURKMENISTAN	10. MEXICO
<b>ITALY / UNITED KINGDOM</b>	11. NICARAGUA *
1. BAHAMAS	12. PANAMA
2. ERITREA	13. PERU
3. SOMALIA	14. URUGUAY
<b>JAPAN</b>	<b>USA</b>
1. AFGHANISTAN	1. ARGENTINA
2. BANGLADESH	2. DOMINICAN REPUBLIC
3. BHUTAN	3. ECUADOR
4. CAMBODIA	4. PANAMA
5. MALAYSIA	
6. MYANMAR	

**17 SUPPORTING STATES**  
**119 REQUESTING STATES**



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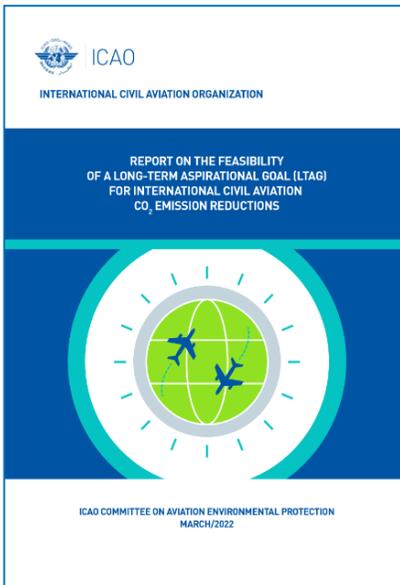
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# SUMMARY (NON-EXHAUSTIVE LIST)



# CAAF/3

# CORSIA





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North American  
Central American  
and Caribbean  
(NACC) Office  
Mexico City

South American  
(SAM) Office  
Lima

ICAO  
Headquarters  
Montréal

Western and  
Central African  
(WACAF) Office  
Dakar

European and  
North Atlantic  
(EUR/NAT) Office  
Paris

Middle East  
(MID) Office  
Cairo

Eastern and  
Southern African  
(ESAF) Office  
Nairobi

Asia and Pacific  
(APAC) Sub-office  
Beijing

Asia and Pacific  
(APAC) Office  
Bangkok



THANK YOU