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# ICAO Strategy to deal with aviation emissions





UN specialized agency

Established by the “Chicago Convention” in 1944

Forum for cooperation in all fields of civil aviation

193 Contracting States

Standards, policies & guidance for environmental protection since 1960's

Focus on aircraft noise, local air quality and global climate

## International Civil Aviation Organization





# The United Nations System



ICAO 2019

75 YEARS OF  
CONNECTING  
THE WORLD

## UN Principal Organs

### General Assembly

#### Subsidiary Organs

Main and other sessional committees  
Disarmament Commission  
Human Rights Council  
International Law Commission  
Standing committees and ad hoc bodies

#### Funds and Programmes<sup>1</sup>

**UNDP** United Nations Development Programme  
• **UNCDF** United Nations Capital Development Fund  
• **UNV** United Nations Volunteers  
**UNEP**<sup>2</sup> United Nations Environment Programme  
**UNFPA** United Nations Population Fund  
**UN-HABITAT**<sup>3</sup> United Nations Human Settlements Programme  
**UNICEF** United Nations Children's Fund  
**WFP** World Food Programme (UN/FAO)

#### Research and Training

**UNIDIR** United Nations Institute for Disarmament Research  
**UNITAR** United Nations Institute for Training and Research  
**UNSSC** United Nations System Staff College  
**UNU** United Nations University

#### Other Entities

**ITC** International Trade Centre (UN/WTO)  
**UNCTAD**<sup>1,4</sup> United Nations Conference on Trade and Development  
**UNHCR**<sup>1</sup> Office of the United Nations High Commissioner for Refugees  
**UNOPS** United Nations Office for Project Services  
**UNRWA**<sup>1</sup> United Nations Relief and Works Agency for Palestine Refugees in the Near East  
**UN-Women**<sup>1</sup> United Nations Entity for Gender Equality and the Empowerment of Women

#### Related Organizations

**CTBTO Preparatory Commission**  
Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization  
**IAEA**<sup>1,3</sup> International Atomic Energy Agency  
**ICC** International Criminal Court  
**ISA** International Seabed Authority  
**ITLOS** International Tribunal for the Law of the Sea  
**OPCW**<sup>3</sup> Organisation for the Prohibition of Chemical Weapons  
**WTO**<sup>1,4</sup> World Trade Organization

### Security Council

#### Subsidiary Organs

Counter-terrorism committees  
International Criminal Tribunal for Rwanda (ICTR)

International Criminal Tribunal for the former Yugoslavia (ICTY)  
Mechanism for International Criminal Tribunals (MICT)  
Military Staff Committee

Peacekeeping operations and political missions  
Sanctions committees (ad hoc)  
Standing committees and ad hoc bodies

#### Advisory Subsidiary Body

Peacebuilding Commission

**HLPF** High-level Political Forum on sustainable development

### Economic and Social Council

#### Functional Commissions

Crime Prevention and Criminal Justice  
Narcotics Drugs  
Population and Development  
Science and Technology for Development  
Social Development  
Statistics  
Status of Women  
United Nations Forum on Forests

#### Regional Commissions<sup>8</sup>

**ECA** Economic Commission for Africa  
**ECE** Economic Commission for Europe  
**ECLAC** Economic Commission for Latin America and the Caribbean  
**ESCAP** Economic and Social Commission for Asia and the Pacific  
**ESCSA** Economic and Social Commission for Western Asia

#### Other Bodies

Committee for Development Policy  
Committee of Experts on Public Administration  
Committee on Non-Governmental Organizations  
Permanent Forum on Indigenous Issues  
**UNAIDS** Joint United Nations Programme on HIV/AIDS  
**UNGEGN** United Nations Group of Experts on Geographical Names

#### Research and Training

**UNICRI** United Nations Interregional Crime and Justice Research Institute  
**UNRISD** United Nations Research Institute for Social Development

#### Specialized Agencies<sup>1,5</sup>

**FAO** Food and Agriculture Organization of the United Nations  
**ICAO** International Civil Aviation Organization  
**IFAD** International Fund for Agricultural Development  
**ILO** International Labour Organization  
**IMF** International Monetary Fund  
**IMO** International Maritime Organization  
**ITU** International Telecommunication Union  
**UNESCO** United Nations Educational, Scientific and Cultural Organization

#### UNIDO United Nations Industrial Development Organization

**UNWTO** World Tourism Organization

**WFP** World Food Programme

**WIPO** World Intellectual Property Organization

**WMO** World Meteorological Organization

**World Bank Group**<sup>7</sup>

• **IBRD** International Bank for Reconstruction and Development  
• **IDA** International Development Association  
• **IFC** International Finance Corporation

### Secretariat

#### Departments and Offices

**EOSG** Executive Office of the Secretary-General  
**DESA** Department of Economic and Social Affairs  
**DFS** Department of Field Support  
**DGACM** Department for General Assembly and Conference Management  
**DM** Department of Management  
**DPA** Department of Political Affairs  
**DPI** Department of Public Information  
**DPKO** Department of Peacekeeping Operations  
**DSS** Department of Safety and Security  
**OCHA** Office for the Coordination of Humanitarian Affairs

**OHCHR** Office of the United Nations High Commissioner for Human Rights  
**OIOS** Office of Internal Oversight Services  
**OLA** Office of Legal Affairs  
**OSAA** Office of the Special Adviser on Africa  
**PBSO** Peacebuilding Support Office  
**SRSG/CAAC** Office of the Special Representative of the Secretary-General for Children and Armed Conflict  
**SRSG/SVC** Office of the Special Representative of the Secretary-General on Sexual Violence in Conflict  
**UNISDR** United Nations Office for Disaster Risk Reduction

**UNODA** United Nations Office for Disarmament Affairs  
**UNODC**<sup>1</sup> United Nations Office on Drugs and Crime  
**UNOG** United Nations Office at Geneva  
**UN-OHRLS** Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States  
**UNON** United Nations Office at Nairobi  
**UNOP**<sup>2</sup> United Nations Office for Partnerships  
**UNOV** United Nations Office at Vienna

### International Court of Justice

### Trusteeship Council<sup>6</sup>

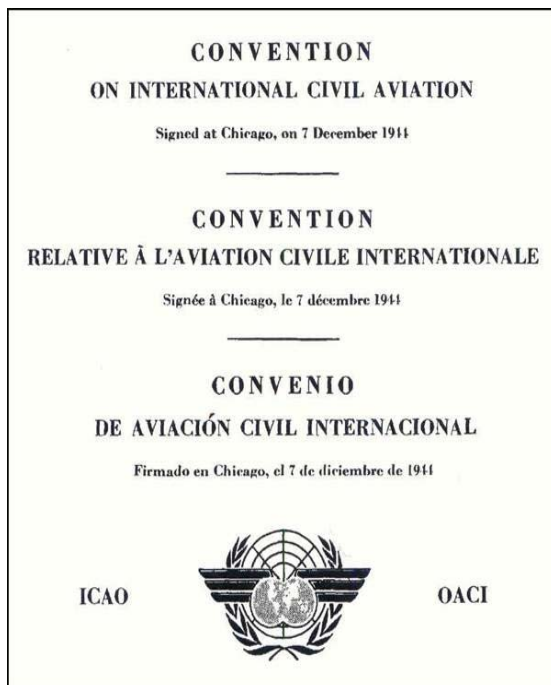
#### Notes:

- All members of the United Nations System Chief Executives Board for Coordination (CEB).
- UN Office for Partnerships (UNOP) is the UN's focal point vis-a-vis the United Nations Foundation, Inc.
- IAEA and OPCW report to the Security Council and the GA.
- WTO has no reporting obligation to the GA, but contributes on an ad hoc basis to GA and Economic and Social Council (ECOSOC) work on, inter alia, finance and development issues.
- Specialized agencies are autonomous organizations whose work is coordinated through ECOSOC (intergovernmental level) and CEB (inter-secretariat level).
- The Trusteeship Council suspended operation on 1 November 1994, as on 1 October 1994 Palau, the last United Nations Trust Territory, became independent.
- International Centre for Settlement of Investment Disputes (ICSID) and Multilateral Investment Guarantee Agency (MIGA) are not specialized agencies but are part of the World Bank Group in accordance with Articles 57 and 63 of the Charter.
- The secretariats of these organs are part of the UN Secretariat.

This Chart is a reflection of the functional organization of the United Nations System and for informational purposes only. It does not include all offices or entities of the United Nations System.



## CONVENTION ON INTERNATIONAL CIVIL AVIATION



- Multilateral Convention between States
  - Today 193 Contracting States
- Basis for conventional law-making, bilateral, and multilateral agreements
- Basis for technical law-making: 19 Technical Annexes
- The Constitution of ICAO, article 44





## Article 44

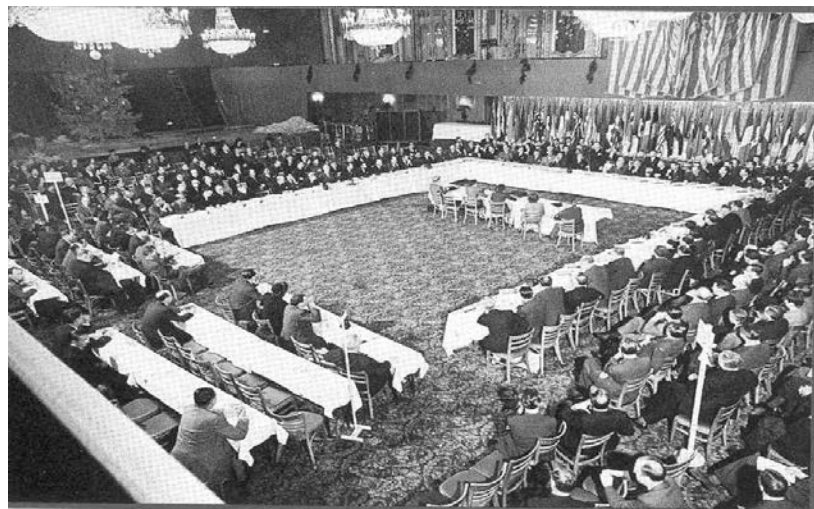
### Objectives

The aims and objectives of the Organization are to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to:

- a) Insure the safe and orderly growth of international civil aviation throughout the world;
- b) Encourage the arts of aircraft design and operation for peaceful purposes;
- c) Encourage the development of airways, airports, and air navigation facilities for international civil aviation;
- d) Meet the needs of the peoples of the world for safe, regular, efficient and economical air transport;
- e) Prevent economic waste caused by unreasonable competition;
- f) Insure that the rights of contracting States are fully respected and that every contracting State has a fair opportunity to operate international airlines;

...

## The Chicago Convention - 1944





<b>PART II. — THE INTERNATIONAL CIVIL AVIATION</b>	
<b>ORGANIZATION</b> .....	20
<b>CHAPTER VII. — The Organization</b> .....	20
<b>CHAPTER VIII. — The Assembly</b> .....	22
<b>CHAPTER IX. — The Council</b> .....	24
<b>CHAPTER X. — The Air Navigation Commission</b> .....	28
<b>CHAPTER XI. — Personnel</b> .....	29
<b>CHAPTER XII. — Finance</b> .....	30
<b>CHAPTER XIII. — Other international arrangements</b> ...	31

<b>DEUXIÈME PARTIE.— L'ORGANISATION DE L'AVIATION</b>	
<b>CIVILE INTERNATIONALE</b> .....	20
<b>CHAPITRE VII.— L'Organisation</b> .....	20
<b>CHAPITRE VIII.— L'Assemblée</b> .....	22
<b>CHAPITRE IX.— Le Conseil</b> .....	24
<b>CHAPITRE X.— La Commission de navigation</b> <b>aérienne</b> .....	28
<b>CHAPITRE XI.— Personnel</b> .....	29
<b>CHAPITRE XII.— Finances</b> .....	30
<b>CHAPITRE XIII.— Autres arrangements</b> <b>internationaux</b> .....	31



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Member States (193)



Assembly



Council (36)



Secretariat





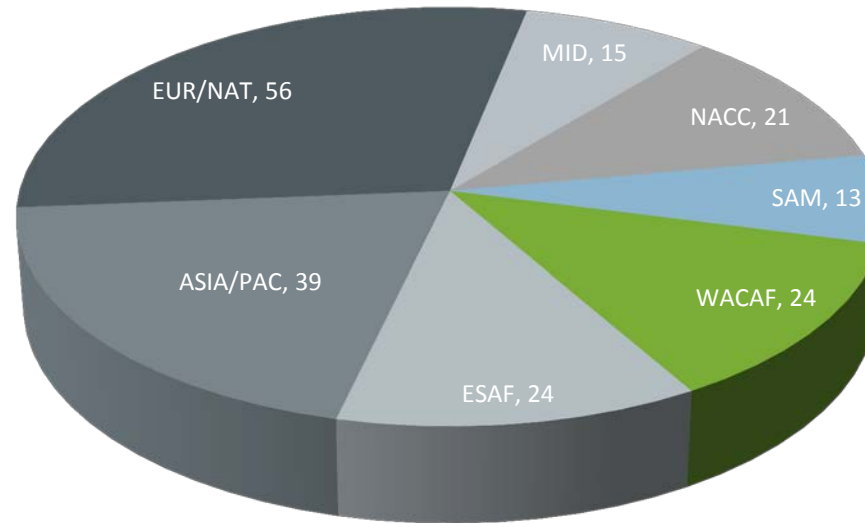
## ICAO Regional Offices







## Number of States to which each ICAO Regional Office is accredited



**ASIA/PAC** covers 31% of the world's air traffic with an annual growth rate of 6.5%

**EUR/NAT** covers 27% of the world's air traffic with an annual growth rate of 2.4%

**MID** covers 9% of the world's air traffic with an annual growth rate of 11.6%



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## TWO COMPLEMENTARY ROLES



**ICAO**

- Develops policies, SARPs, guidance material
- Undertakes oversight audits
- Fosters the development and implementation of global and regional plans
- Provide assistance to States



**STATES**

- Implement SARPs
- Carry out their safety and security oversight responsibilities
- Ensure sufficient capacity to implement SARPs



## STANDARDS AND RECOMMENDED PRACTICES

### Article 37: Adoption of international standards and procedures

- **STANDARD** - “any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which contracting States will conform in accordance with the Convention”

*(Arts. 37, 38 and 54 of the Chicago Convention)*

- 
- **RECOMMENDED PRACTICE** - “any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation and to which contracting States will endeavor to conform in accordance with the Convention”

*(Arts. 37 and 54 of the Chicago Convention)*





## STANDARDS AND RECOMMENDED PRACTICES

### Article 37: Adoption of international standards and procedures

- **STANDARD** - “any specification for physical characteristics, configuration,

States undertake to comply or immediately file a difference

Convention

*(Arts. 37, 38 and 54 of the Chicago Convention)*

- 
- **RECOMMENDED PRACTICE** - “any specification for physical characteristics,

“Best practice”, but recommendation only

*(Arts. 37 and 54 of the Chicago Convention)*

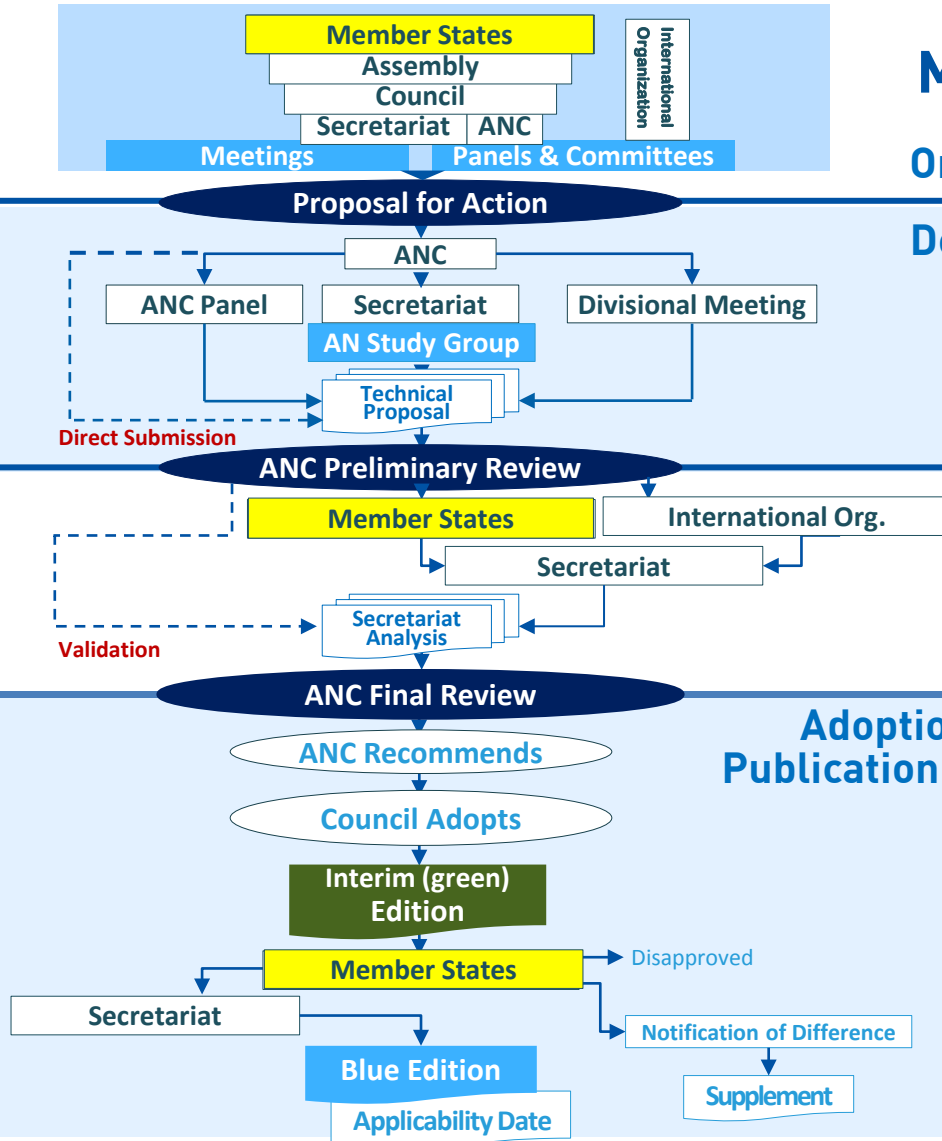
# MAKING ICAO STANDARDS

## Origin of Proposal

## Development Phase

## Review Phase

## Adoption/ Publication Phase



0-5 Years

Approximately 2 Years

3 Months

10 Months Approximately

**Adoption Date**  
(Usually March)

2 Weeks

4 Month

**Effective Date**

(Amendment becomes effective if not disapproved by majority of States)

4 Month Minimum

**Applicability Date**  
(Usually November)



International  
Civil Aviation  
Organization

Organisation  
de l'aviation civile  
internationale

Organización  
de Aviación Civil  
Internacional

Международная  
организация  
гражданской  
авиации

منظمة الطيران  
المدني الدولي

国际民用  
航空组织

Tel.: +1 514-954-8219 ext. 6726

Ref.: AN 1/17.14 – 18/78

20 July 2018

**Subject:** Adoption of the First Edition of Annex 16,  
Volume IV

**Action required:** a) notify any disapproval before  
22 October 2018; b) notify any differences and  
compliance before 1 December 2018; c) consider the use  
of the Electronic Filing of Differences System (EFOD)  
for notification of differences and compliance

Sir/Madam,

1. I have the honour to inform you that the First Edition of the *International Standards and Recommended Practices, Environmental Protection — Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)* (Annex 16, Volume IV to the *Convention on International Civil Aviation*) was adopted by the Council at the tenth meeting of its 214th Session on 27 June 2018. Copies of the Amendment and the Resolution of Adoption are available as attachments to the electronic version of this State letter on the ICAO-NET (<http://portal.icao.int>).

2. When adopting the First Edition of Annex 16, Volume IV, the Council prescribed 22 October 2018 as the date on which it will become effective, except for any part concerning which a majority of Contracting States have registered their disapproval before that date. In addition, the Council resolved that the First Edition, to the extent it becomes effective, will become applicable on 1 January 2019 for the elements concerning the development and application of Standards and Recommended Practices (SARPs) for CORSIA implementation.

3. At the 39th Session of the ICAO Assembly, held from 27 September to 7 October 2016, ICAO Member States adopted Assembly Resolution A39-3 related to CORSIA, and requested the Council to develop SARPs and related guidance material for the implementation of CORSIA.

## ICAO ANNEX AMENDMENTS

### State letter Adoption of First Edition of Annex 16 Vol. 4

**Attachment A:** Adoption of the Forward of the Annex;

**Attachment B:** Disapproval Form;

**Attachment C:** Compliance Form;

**Attachment D:** Note on the notification of differences (Guidance on the determination and reporting of differences);

**Attachment E:** Implementation task list;

**Attachment F:** Impact assessment in relation to the first edition of the Annex or of the amendment.





## ICAO ANNEX AMENDMENTS

ATTACHMENT A to State letter AN 1/17.14 – 18/78

FOREWORD OF THE FIRST EDITION OF ANNEX 16, VOLUME IV

Add the following elements at the end of Table A:

<i>Amendment</i>	<i>Source(s)</i>	<i>Subject</i>	<i>Adopted/Approved Effective Applicable</i>
1st Edition	Committee on Aviation Environmental Protection (CAEP) Steering Group (SG) Meeting (SG2017, 11 to 15 September 2017)	Introduction of Annex 16, Volume IV, containing Standards and Recommended Practices relating to the implementation of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).	27 June 2018 22 October 2018 1 January 2019

27 June 2018



1 Jan. 2019





## NOTIFICATION OF DIFFERENCE

### Article 38: Departures from international standards and procedures

**States  
Must  
Notify  
ICAO,  
IF THEY**



Do not comply with a Standard in **all** respects



Do not bring its regulations or practices into **full** accord with any Standard



Adopt regulations or practices differing in any particular respect from the Standard

### 3 CATEGORIES OF DIFFERENCES



More exacting  
or exceeds a SARP



Different in character or  
other means of compliance



Less protective,  
partially implemented,  
not implemented



## Letter of Differences Notification

ATTACHMENT C to State letter AN 1/17.14 – 18/78

### NOTIFICATION OF COMPLIANCE WITH OR DIFFERENCES FROM ANNEX 16, VOLUME IV

To: The Secretary General  
International Civil Aviation Organization  
999 Robert-Bourassa Boulevard  
Montréal, Québec  
Canada H3C 5H7

1. No differences will exist on \_\_\_\_\_ between the national regulations and/or practices of (State) \_\_\_\_\_ and the provisions of Annex 16, Volume IV.

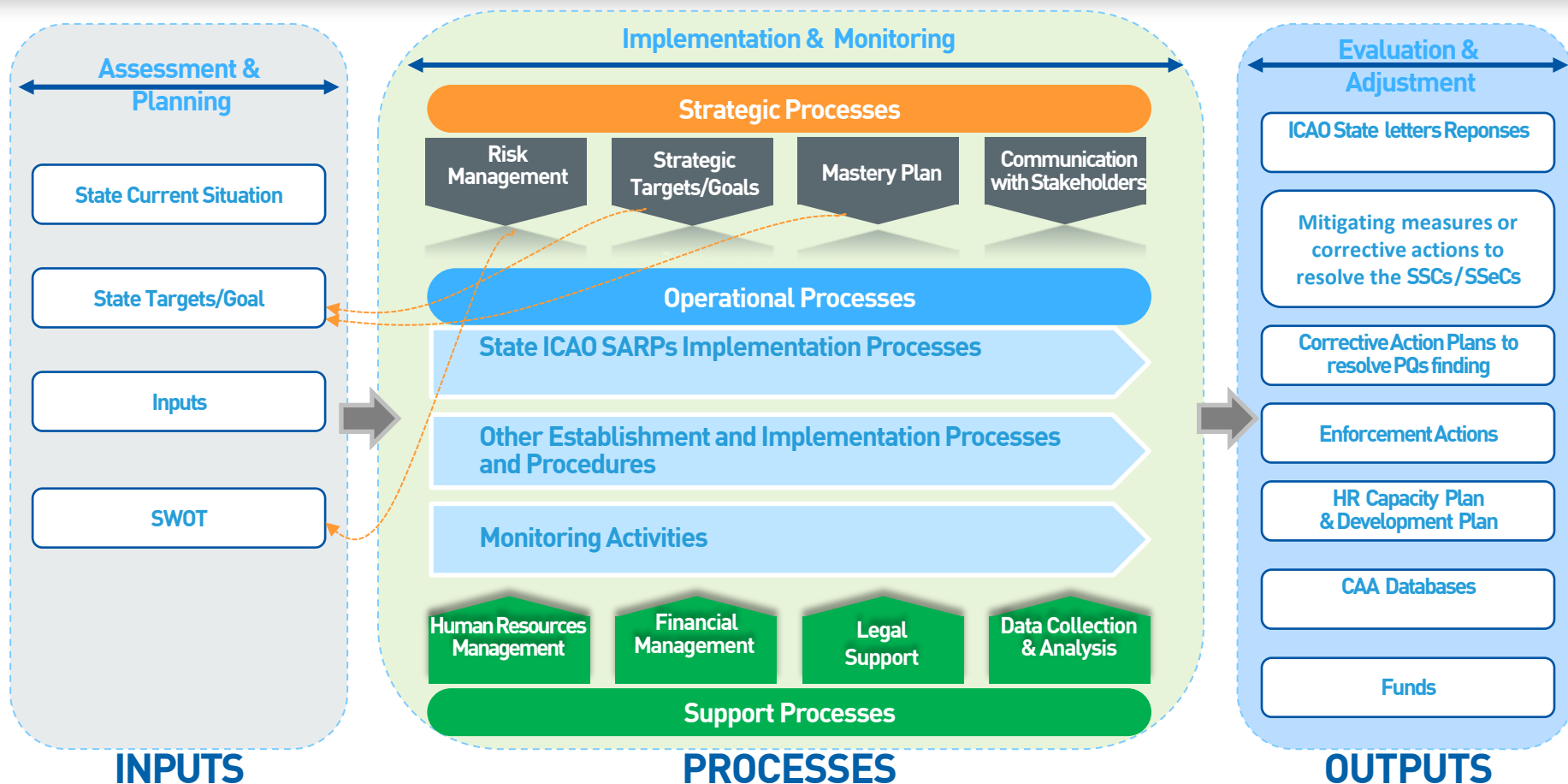
2. The following differences will exist on \_\_\_\_\_ between the regulations and/or practices of (State) \_\_\_\_\_ and the provisions of Annex 16, Volume IV (please see Note 2).

- | a) Annex Provision<br>(Please give exact paragraph reference) | b) Details of Difference<br>(Please describe the difference clearly and concisely) | c) Remarks<br>(Please indicate reasons for the difference) |
|---|--|--|
|---|--|--|

(Please use extra sheets as required)

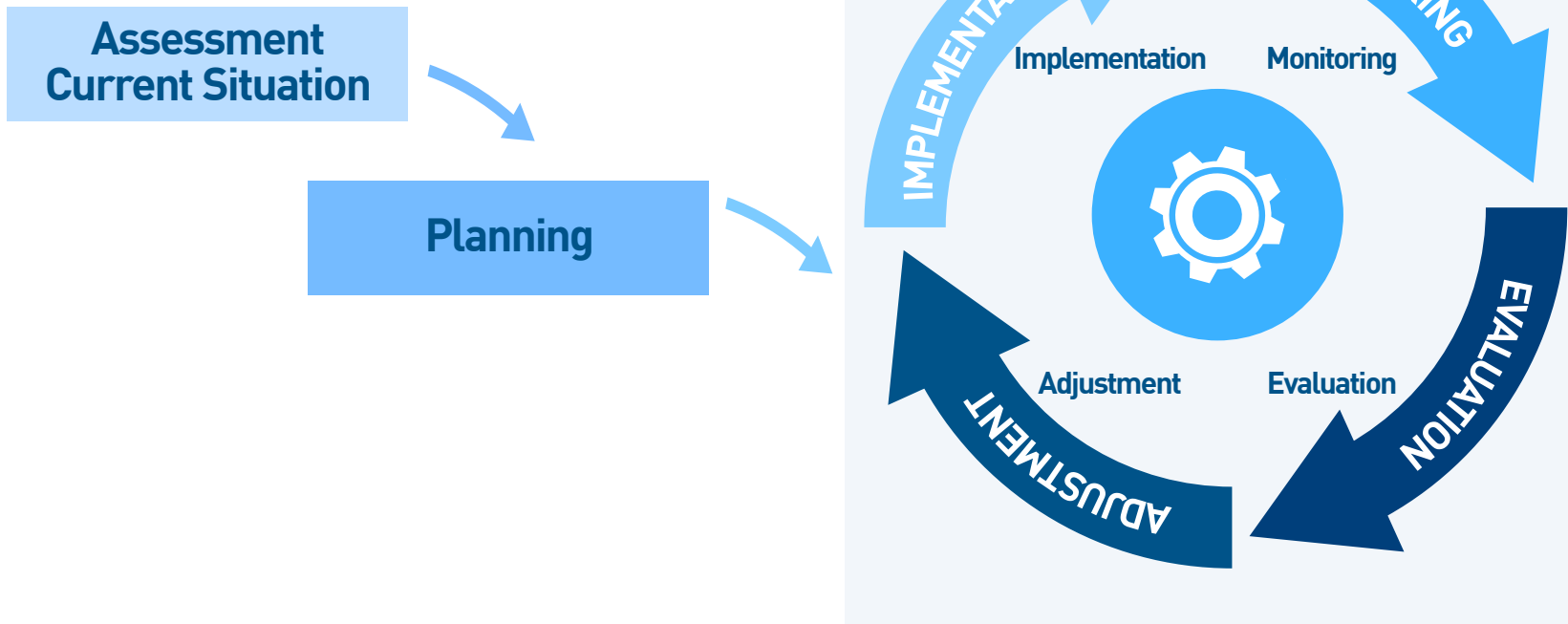


# MECHANISM OF MANAGING COMPLIANCE WITH ICAO SARP<sub>s</sub>





## MECHANISM OF MANAGING COMPLIANCE WITH ICAO SARPs - GENERAL APPROACH





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# ICAO STRATEGIC OBJECTIVES



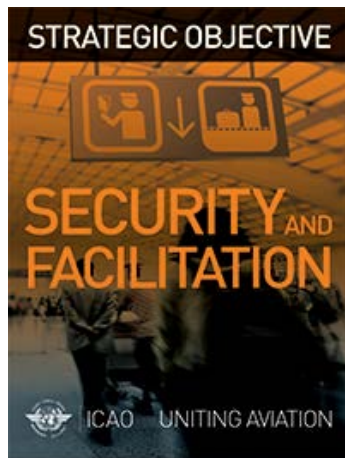
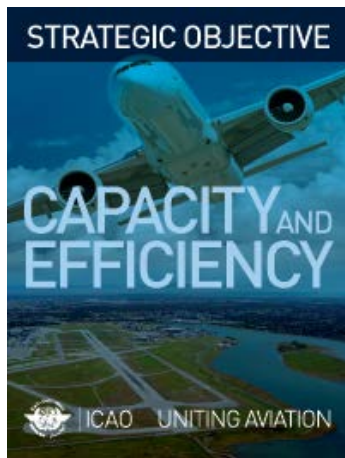
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## ICAO STRATEGIC OBJECTIVES





## United Nations Framework



ICAO ENV Strategic  
Objective address  
**14** the 17 UN 2030  
SDGs







## ENV - Historical background

ICAO has been working with environmental issues since 1960s

- Aircraft noise
  - Aircraft engine emissions
- 
- Environmental activities are largely carried out through its **Committee on Aviation Environmental Protection (CAEP)**, a Technical Committee of the ICAO Council



## Historical background

- 1970     **CAN** – Committee on Aircraft Noise
- 1971     First SARPs for aircraft noise, designated as Annex 16 to the *Convention on International Civil Aviation* (Chicago, 1944)
- 1977     **CAEE** – Committee on Aircraft Engine Emissions



➤ 1981

Annex 16 expanded to encompass SARPs dealing with the control of aircraft engine emissions

➤ Annex 16

1st editions 1981

➤ Volume I, Aircraft Noise Volume II, Aircraft Engine Emissions

➤ 1983

**CAEP** (Committee on Aviation Environmental Protection)

➔ Superseded CAN and CAEE



## Committee on Aviation Environmental Protection - CAEP

- CAEP is a technical committee of the ICAO Council established in 1983. CAEP assists the Council in formulating new policies and adopting new Standards and Recommended Practices (SARPs) related to aircraft noise and emissions, and more generally to aviation environmental impact.
- CAEP undertakes specific studies, as requested by the Council. Its scope of activities encompasses noise, local air quality and the basket of measures for reducing international aviation CO<sub>2</sub> emissions, including aircraft technology, operational improvement, sustainable aviation fuels and market-based measures (CORSIA).



## CAEP Directives

effective date of these revised CAEP Directives, as per Council decision C-DEC 215/8)

1. CAEP's purpose
2. Methods of operations
3. Terms of reference and work programme
4. Membership:
  - CAEP members
  - CAEP observers
5. Participation
6. Organization of CAEP and Steering Group meetings
7. Organization of sub-group meetings
8. Governance
9. Languages
10. Transparency
11. Report to the Council





## CAEP Terms of Reference (1 February 2019)

To undertake specific studies, as approved by the Council, related to control of aircraft noise and emissions from aircraft engines and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

In its work the Committee shall take into account the following:

1. effectiveness and reliability of certification schemes from the viewpoint of technical feasibility, economic reasonableness and environmental benefit to be achieved;
2. developments in other associated fields, e.g. land use planning, noise abatement operating procedures, emission control through operational practices, etc.;
3. international and national programmes of research into control of aircraft noise and emissions from aircraft engines;
4. the potential interdependence of measures taken to control noise and to control engine emissions;

With regards to CORSIA, the Committee shall address technical issues relating to the implementation of CORSIA.



## CAEP Members

- CAEP Members are **experts** nominated by their States to participate in and contribute substantially to the committee's work.
- In participating in the work of CAEP, Members may reflect the opinions of their administrations but do not commit their States in doing so.
- **They may also be considered free to reflect technical views which neither represent nor commit their States.**
- CAEP Members have the right to vote, move or second motions or amendments in discussions of the committee.



## CAEP Observers

- CAEP Observers are experts nominated by States, international non-governmental organizations, United Nations bodies and regional State organizations to bring their specific views that would not otherwise be available to the work of CAEP.
- CAEP Observers have the right to take part in discussions of the CAEP but without the right to vote, move or second motions or amendments.

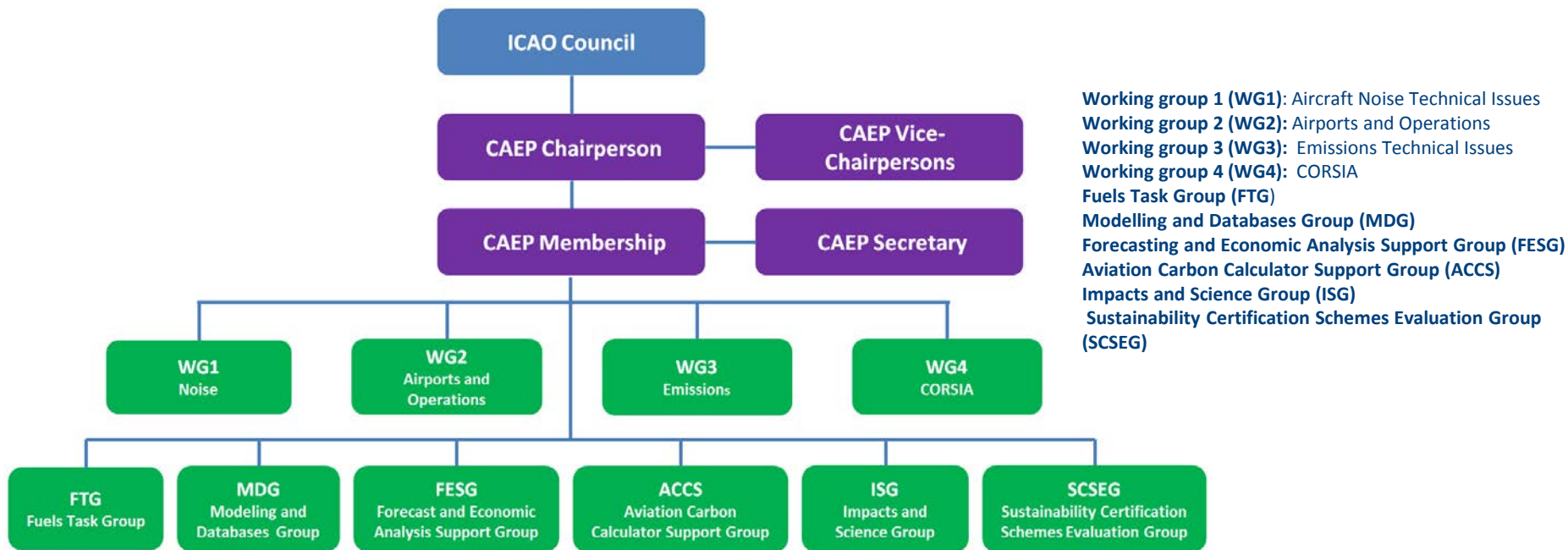


## Report to Council

- CAEP submits reports of its formal meetings to the **Council**.
- The Council refers such reports to the **Air Navigation Commission** for a preliminary review and may at its discretion refer such reports also to the **Air Transport Committee** for a preliminary review of relevant portions of the report.
- The Air Navigation Commission and/or the Air Transport Committee will present reports on their respective preliminary reviews to the Council for its consideration.



## CAEP Structure leading up to CAEP/12



As of March 2019, CAEP is composed of 26 Members from all regions of the world and 19 Observers. More than 600 internationally-renowned experts are involved in CAEP activities and working groups.





## Work programme - main outcomes of the last cycle

### Aircraft Engine Standard

- Agreement on a new stringency level that would limit the emissions of non-volatile Particulate Matter (nvPM) from aircraft engines - is expected to drive technologies to address non-volatile particulate matter to minimize their potential environmental and health impacts.
- new technology goals for the sector, including:
  - improvements of aircraft noise up to 15.5 dB below Chapter 14 limits for single-aisle aircraft by 2027,
  - NOx emission by 54 per cent relative to the latest ICAO NOx SARPs and
  - fuel efficiency up to 1.3 per cent per annum can be expected for the new aircraft entering into production.



## Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

- Agreement on the means to calculate and claim the benefits accrued from the use of sustainable aviation fuels within the context of CORSIA.
- agreement on the default values and the methodologies for calculating life-cycle CO<sub>2</sub> emissions reduction benefits of different feedstocks.
- CAEP has also agreed on the requirements for Sustainability Certification Schemes (SCS) and a process to evaluate and recommend a list of eligible SCS, which will certify fuels against the CORSIA sustainability criteria.
- CAEP has delivered a recommendation for the rules and procedure for the ICAO Council's Technical Advisory Body (TAB) to evaluate the eligibility of emissions units for use in CORSIA.



## Environmental Trends and Outlook

- updated ICAO environmental trends for noise, local air quality (NO<sub>x</sub> and nvPM) and global climate (CO<sub>2</sub>),
- ICAO's eco-airport toolkit collection in the areas of renewable energy, waste management, environmental management, and eco-design of airport building.
- Synthesis Report on climate adaptation was approved for publication, information on the climate risk impacts and resilient options for the sector.
- Reports on the state of aircraft end-of-life and recycling; and the other on performance-based navigation and community engagement.
- assessment of the positive effects of operational improvements, as per ICAO global plans: savings of fuel between of 167 to 307 kg per flight can be achieved by 2025, corresponds respectively to a reduction of 26.2 to 48.2 Mt of CO<sub>2</sub>



- The meeting agreed on the publication of the white paper “State of the Science 2019: Aviation Noise Impacts Workshop”.
- CAEP also considered the progress that has been achieved towards supersonic transport operations, and agreed that an exploratory study should be undertaken.
- CAEP will also assess how to certify other new technologies such as hybrid and electric aircraft as part of its future work.



## Basket of CO<sub>2</sub> mitigation measures

<b>Aircraft technology</b>	<b>First-ever global CO<sub>2</sub> certification Standard</b> for new types and in-production aeroplanes. <b>Fast-paced innovation</b> (new designs, composite materials, hybrid-electric aircraft, renewable energy sources, etc.).	
<b>Operational improvements</b>	<b>CO<sub>2</sub> benefits from air traffic management; air navigation; green airports; etc.</b>	
<b>Sustainable aviation fuels</b>	<b>Around 200,000 commercial flights with drop-in aviation fuels; 6 conversion processes; 7 airports distributing drop-in aviation fuels</b>	
<b>Global market-based measure</b>	<b>Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)</b>	





## ICAO Public Website



ICAO / Environmental Protection

<https://www.icao.int/environmental-protection/Pages/default.aspx>

- Home
- Scientific Understanding
- Environmental Trends
- Technology Goals & Standards
- Aircraft Noise
- Local Air Quality
- Climate Change
- State Action Plans
- Capacity Building and Assistance
- Airports
- CAEP
- E-Tools and Models
- Innovation
- Publications
- Statements
- Events
- Contact us

### Environmental Protection



Improving the environmental performance of aviation is a challenge ICAO takes very seriously. In fulfilling its responsibilities, the Organization developed a range of standards, policies and guidance material for the application of integrated measures to address aircraft noise and emissions embracing technological improvements, operating procedures, proper organization of air traffic, appropriate airport and land-use planning, and the use of market-based options.

All of this has contributed to aircraft operations that today can be 70% more efficient than in the 1970s.

In 2004, ICAO adopted three major environmental goals, to:

- a. limit or reduce the number of people affected by significant aircraft noise;
- b. limit or reduce the impact of aviation emissions on local air quality; and



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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