



**Workshop on Aviation Operational Measures
for Fuel and Emissions Reductions –
Montreal, Canada, 20 – 21 September 2006**



An Overview of ICAO's Work on Aviation Environmental Protection

Jane Hupe
Chief, Environmental Unit



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PRESENTATION PLAN

- ➔ ICAO – International Civil Aviation Organization
- ➔ ICAO'S work on the environment
- ➔ Standards and Policies
- ➔ CAEP
- ➔ Work on Aircraft Engine Emissions
- ➔ The ICAO Circular



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ICAO – International Civil Aviation Organization

- Specialized Agency of the United Nations
- Created in 1944 by the Convention on International Civil Aviation (Chicago Convention)
- Mission: to promote the safe and orderly development of international civil aviation throughout the world. It sets standards and regulations necessary for aviation safety, security, efficiency and regularity, as well as for aviation environmental protection.
- The Organization serves as the forum for cooperation in all fields of civil aviation among its 189 Contracting States.



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- ➔ Continuing growth
- ➔ Increased public awareness
- ➔ New information emerging on problems to which civil aviation may be contributing



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BACKGROUND

- ICAO has been working with environmental issues since 1960's
 - ✱ Aircraft noise
 - ✱ Aircraft engine emissions
 - ✱ Local problems at airports
- The Organization's current environmental activities are largely carried out through its Committee on Aviation Environmental Protection (CAEP)



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BACKGROUND

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



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BACKGROUND

→ 1981 - Annex 16 was expanded to encompass SARPs dealing with the control of aircraft engine emissions.

✱ **Annex 16:** Volume I, Aircraft Noise
Volume II, Aircraft
Engine Emissions

→ 1983 - CAEP - Committee on Aviation
Environmental Protection

✱ to supersede CAN and CAEE



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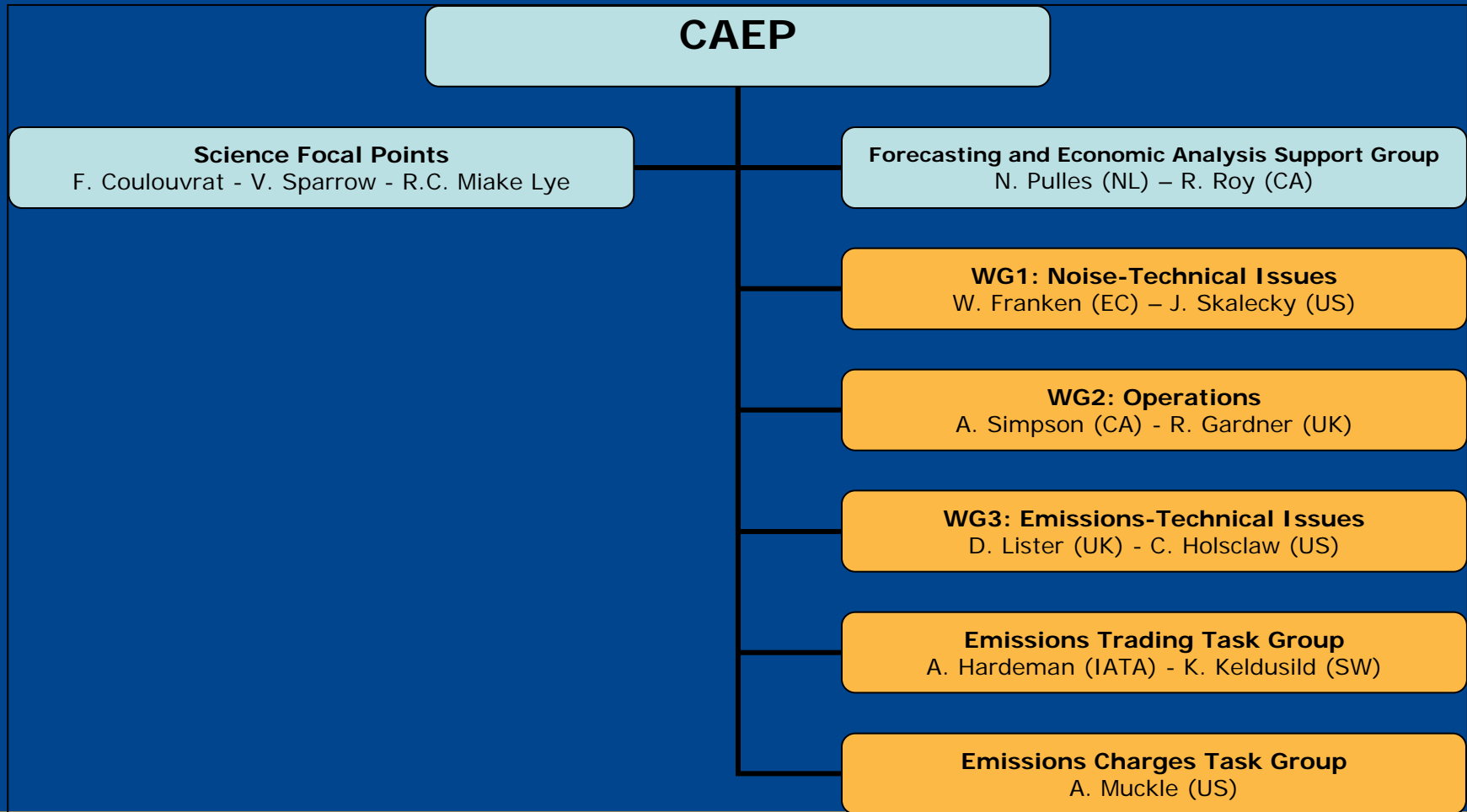




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CAEP Structure leading up to CAEP/7





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CAEP Members (21) and Observers

Argentina

Australia

Brazil

Canada

Egypt

France

Germany

India

Italy

Japan

Netherlands

Poland

Russian

Federation

Singapore

South Africa

Spain

Sweden

Switzerland

Tunisia

United

Kingdom

United States



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CAEP Members and Observers (12)

GREECE

EC

ICSA

NORWAY

IATA

IFALPA

ACAC

IBAC

UNFCCC

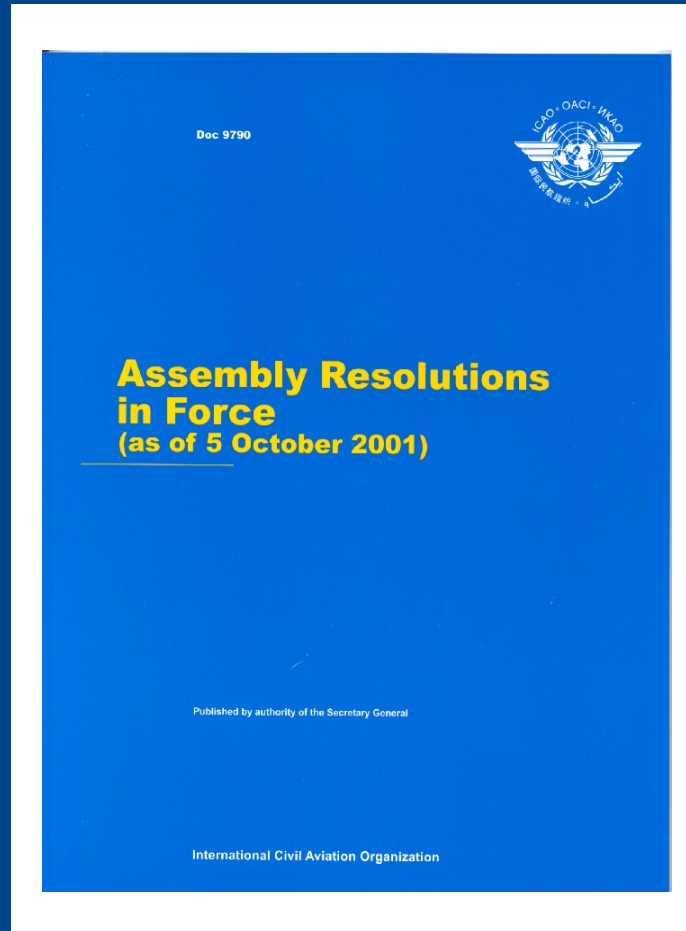
ACI

ICCAIA

WMO



ICAO POLICIES AND STANDARDS



**A35-5:
Consolidated
statement of
continuing
ICAO policies
and practices
related to
environmental
protection**



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- Appendix A: General
- Appendix B: Development of Standards, Recommended Practices and Procedures and/or guidance material relating to the quality of the environment



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- Appendix C: Policies and programmes based on a “balanced approach” to aircraft noise management
- Appendix D: Phase-out of subsonic jet aircraft which exceed noise levels in Volume I of Annex 16



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- Appendix E: Local noise-related operating restrictions at airports
- Appendix F: Land-use planning and management
- Appendix G: Supersonic aircraft – the problem of sonic boom



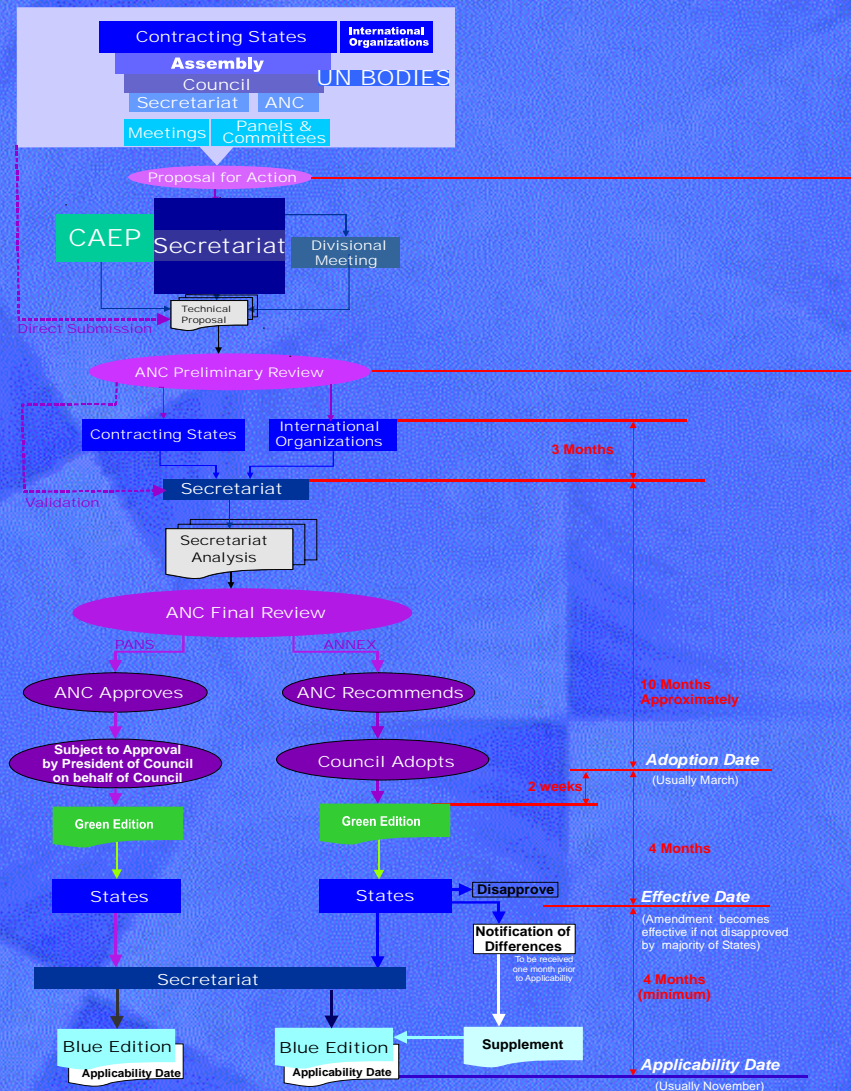
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- ➔ **Appendix H: Environmental impact of civil aviation on the atmosphere**
- ➔ **Appendix I: Market-based measures regarding aircraft engine emissions**

Making an ICAO Standard



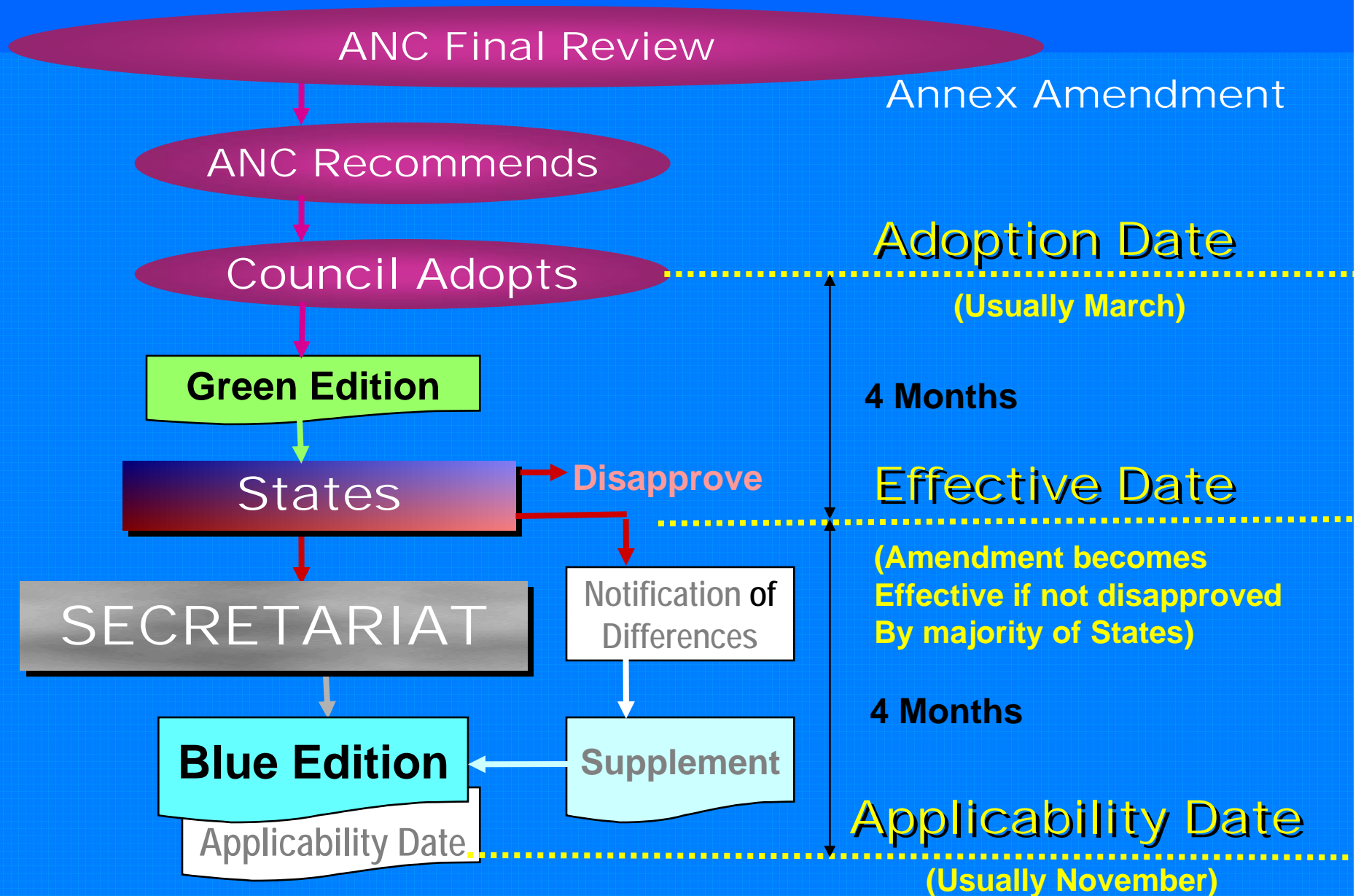
Origin of Proposal

Development Phase

Review Phase

Adoption/
Publication Phase

Adoption/Publication Phase





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Aircraft Engine Emissions

Problems

- Impact on air quality near airports
- Contributing to global atmospheric problems – GLOBAL CLIMATE

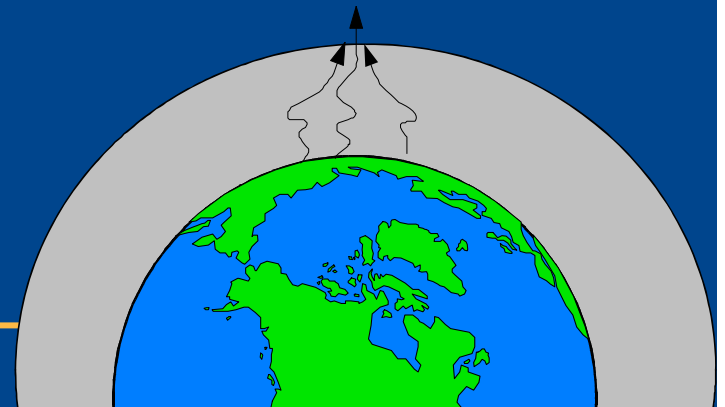


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Global Atmospheric Problems

- Climate change (the “Greenhouse” effect)
- Depletion of ozone layer





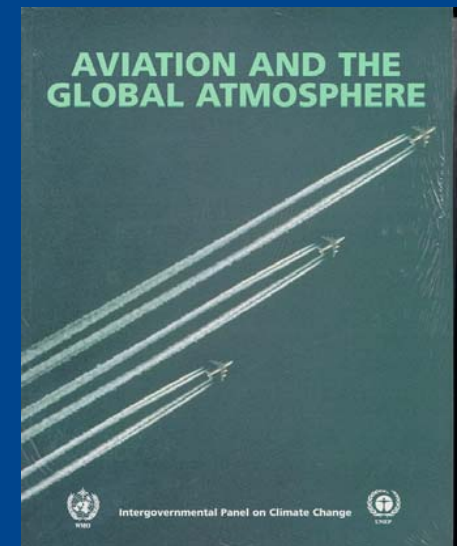
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Intergovernmental
Panel on
Climate Change

Special Report on
Aviation and the Global Atmosphere

- Prepared at ICAO's request
- Completed April 1999
- Covered both climate change and ozone depletion





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IPCC Report

Contributions to climate change from:

- Carbon dioxide (CO₂)
- Oxides of nitrogen (NO_x), producing ozone
- Water vapour
- Contrails and cirrus clouds
- Sulphate and soot aerosols



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Regarding climate change :

IPCC Report

- Current impact of aviation is about 3.5% of the total radiative forcing by all human activities
- Proportion expected to increase



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Regarding ozone depletion :

IPCC Report

- A substantial fleet of supersonic aircraft could be a problem
- Present subsonic fleet is probably not



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Liaison with other UN Policy-making Bodies -UNFCCC



- All States must develop national inventories of emissions
- Developed countries aimed to stabilize greenhouse gas emissions at 1990 levels by year 2000
- Additional commitments by developed countries (Kyoto, Dec 1997)



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UNFCCC



- ➔ Domestic aviation emissions are included in Parties' inventories
- ➔ International aviation emissions (bunker fuels) are reported but not included in national totals



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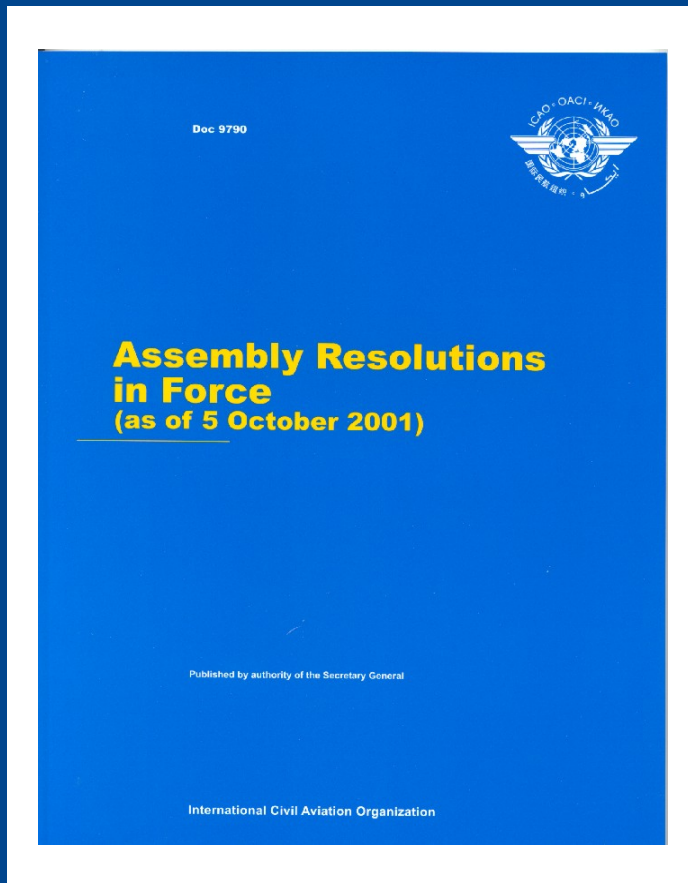


Kyoto Protocol

- Developed countries are required to reduce greenhouse gas emissions by an average of 5% (compared with 1990) by 2008 - 2012

AND to

- Pursue limitation or reduction of emissions of greenhouse gases from aviation bunker fuels, *working through ICAO*



A35-5: Consolidated statement of continuing ICAO policies and practices related to environmental protection



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Assembly Resolution A 35-5

- ➔ **Appendix H: Environmental impact of civil aviation on the atmosphere**
- ➔ **Appendix I: Market-based measures regarding aircraft engine emissions**



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Assembly Resolution A35-5, Appendix H

- Requests the Council to continue to study policy options to limit or reduce the environmental impact of aircraft engine emissions;
- To place special emphasis on the use of technical solutions while continuing its consideration of market-based measures
- To take into account the potential implications for developing as well as developed countries



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Assembly Resolution A35-5, Appendix H (cont.)

- To continue to assist the UN FCCC; and
- To promote the use of operational measures outlined in Circ.303 as a means to limiting or reducing the environmental impact of engine emissions



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CAEP is considering ...

- Technology and standards
- Operational measures
- Market-based measures



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Technical Issues

- NOx Standards were first adopted in 1981 then made more stringent in 1993, when ICAO reduced the permitted levels by 20% for newly certificated engines and again in 1998 by about 16%, on average for engines newly certificated from 31 December 2003.
- More recently new NOx standards 12 percent more stringent than the current levels were agreed for applicability in 2008. The proposed Standards are part of a two-step approach whereby manufacturers and the research community (public and private) would make every effort to pursue the development of technology that would provide a significant reduction in emissions, especially NOx, for consideration by CAEP/8 in 2010.

Annex 16, Vol II

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

**ENVIRONMENTAL
PROTECTION**

ANNEX 16
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME II
AIRCRAFT ENGINE EMISSIONS
SECOND EDITION — JULY 1993



This edition incorporates all amendments to Annex 16 adopted by the Council prior to 25 March 1993 and supersedes, on 11 November 1993, all previous editions of the Annex.

For information regarding the applicability of the Standards and Recommended Practices, see Foreword and the relevant clauses in each chapter.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Doc 9646

Doc 9646-AN/943

**ICAO ENGINE
EXHAUST EMISSIONS
DATA BANK**

FIRST EDITION — 1995



*Approved by the Secretary General
and published under his authority*

INTERNATIONAL CIVIL AVIATION ORGANIZATION



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Market-based Measures

- Emissions trading
- Voluntary measures
- Emission-related levies (charges or taxes)



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Voluntary Measures

- Advantage to be a short-term measure
- Assembly urged Council to facilitate actions by developing guidelines
- Template Agreement - available on the ICAO web site: www.icao.int



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Operational Issues

- ALLPIRG 4 – Methodology to estimate the environmental benefits of the implementation of CNS/ATM Systems
- CAEP 4 – Parametric Model – Global Plan for CNS/ATM
- Updated for ALLPIRG/5 (March 2006)
- Currently considering more sophisticated models
- Collecting data for the assessment of other regions



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Operational Issues

- ➔ ICAO Circular – Operational Opportunities to minimize fuel use and reduce emissions
- ➔ Workshops : Madrid, May 2002;
Ottawa, 5 to 6 November 2002; and
Montreal, September 2006



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ICAO CIRCULAR

CAEP/4 (Montreal, April 1998)

“ensure the development, dissemination and, to the maximum practical extent, use of the best operating practices to achieve near term reductions in aircraft emissions, including aircraft ground-level and in-flight operations, ground service equipment (GSE) and APUs with potential actions to facilitate their broader adoption.”



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ICAO CIRCULAR

- ✿ Information provided by regulatory authorities, air traffic management (ATM) providers, airline associations, airport operators, manufacturers, specific airlines and ICAO Secretariat.
- ✿ CAEP/5 (Montreal, 2001) - ICAO to publish as a circular;
- ✿ CAEP/6 – (Montreal, 2006) TEMPLATE Available on the WEB
- ✿ A33-7 & A35-5- to promote the circular



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ICAO CIRCULAR OBJECTIVES

- ➔ document industry experience and the environmental benefits resulting from optimizing the use of current aircraft and infrastructure, and the related benefits of infrastructure improvements; and
- ➔ demonstrate that the more efficient use of infrastructure is an effective means of reducing aviation emissions.



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ICAO CIRCULAR

- ➔ This circular is based on the understanding that the most effective way to minimize aircraft emissions is to minimize the amount of fuel used in operating each flight. It reflects operational opportunities and identifies areas where improvements are important;
- ➔ It is aimed at airlines, airports, ATM/air traffic control (ATC) service providers, airworthiness authorities, environmental and other government bodies;



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ICAO CIRCULAR

- ✈ The content is not of a regulatory nature and the choice of many of the operational procedures presented depends upon many factors other than environmental benefits;
- ✈ Safety must always be the over-riding consideration in all civil aviation operations.



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Transport
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**Keeping track of ICAO's
environmental activities**

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Thank you