

Ad hoc Working Group on further Commitments for  
Annex I Parties under the Kyoto Protocol

Emissions from international  
air transport and related  
policies

**ICAO - International Civil Aviation  
Organization**

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# International Civil Aviation Organization

- Specialized Agency of the United Nations
- Created in 1944 by the Convention on International Civil Aviation (Chicago Convention)
- Membership: 190 Contracting States
- Structure: Assembly, Council & other standing bodies
- Data, SARPs (Annexes), Guidance (Docs) and Policies (A-Res)
- Strategic Objective on Environmental Protection : Minimize the adverse effect of global civil aviation on the environment
- ICAO Global Climate Goal: to **Limit or reduce the impact of aviation GHG emissions on the global climate;**

# Aviation and climate change

- Aviation contributes about 2% of globally produced CO<sub>2</sub> and accounts for 13% of fossil fuels consumed by transport (IPCC, 2007).
- Around 2 Billion passengers are transported by air.
- International traffic represents almost 60% of the total scheduled passenger traffic and about 83% of freight air traffic.
- Total scheduled passenger traffic worldwide is forecast to increase at an average annual rate of 4.6 per cent for the period 2005–2025.

**1970**  
**CAN**  
**(Noise)**

**1977**  
**CAEE**  
**(Emissions)**

**1983**  
**CAEP**

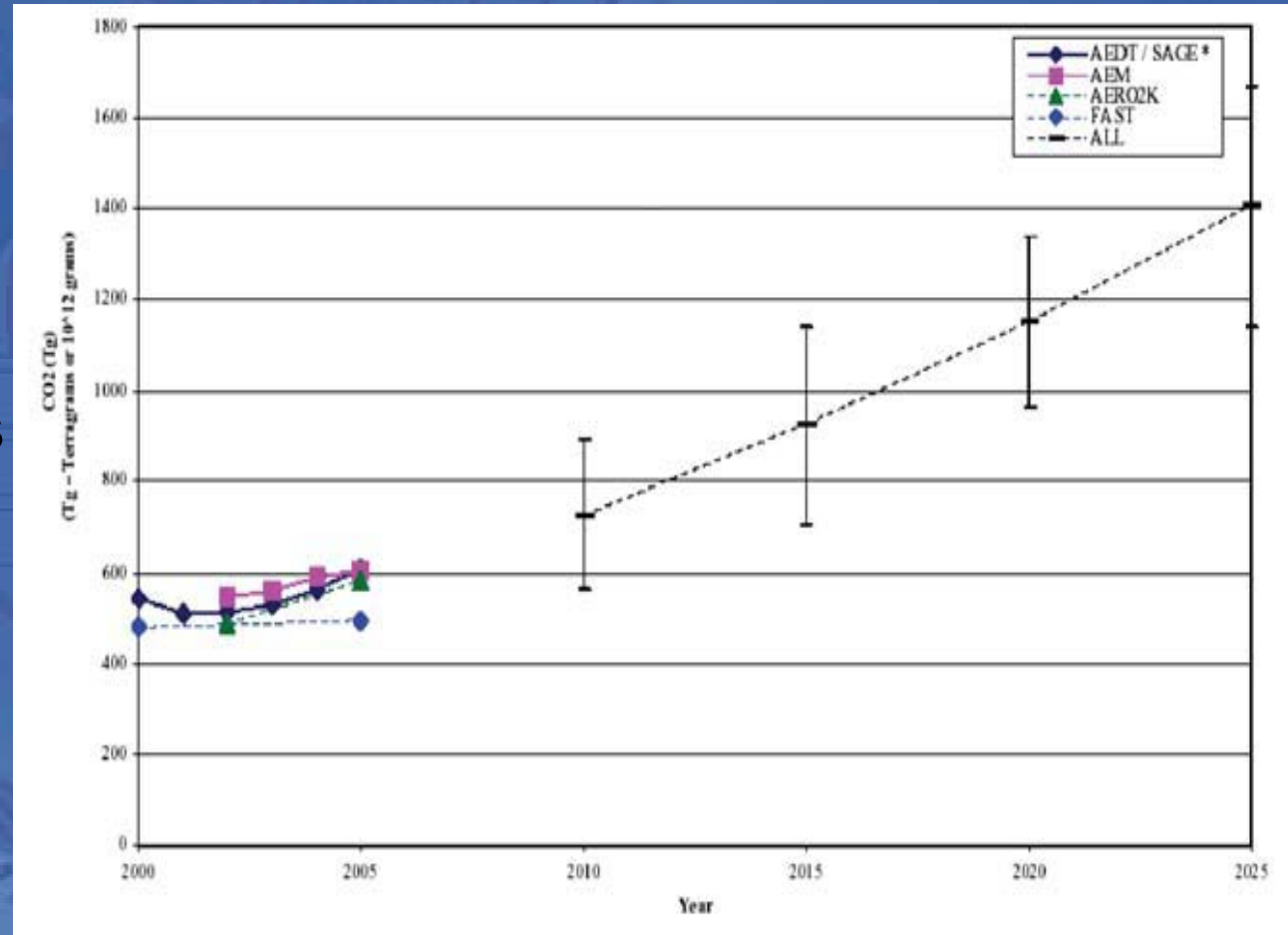
- Technical feasibility
- Environmental effectiveness
- Economic reasonableness
- Interdependencies of measures

# QUANTIFICATION

## CAEP MODELLING RESULTS

-Initial assessment of available models

-Initial trends for CO<sub>2</sub> (ICAO Goals Assessment)



· Total aviation CO<sub>2</sub> emissions model results (2000-2025).

· Note: AEDT / SAGE (2000-2004) results have been adjusted down by 5% to account for the revised modelling assumptions resulting from migration from SAGE Version 1.5 to AEDT / SAGE in 2005. Projections of future technology developments are not included in this assessment

# ONGOING WORK ON QUANTIFICATION

1. New Pax and Fleet Forecasts over 30 years horizon (2006 to 2036) and covering scheduled and non-scheduled operations by May 2008
2. Scenarios and projections of the traffic forecast for 2050
3. Cost-Effectiveness analysis of new NO<sub>x</sub> stringencies
4. Economic analysis of the financial impact of including international aviation in existing trading schemes
5. Literature review of the cost-benefit analysis of existing trading schemes

# ONGOING WORK ON QUANTIFICATION (cont'd)

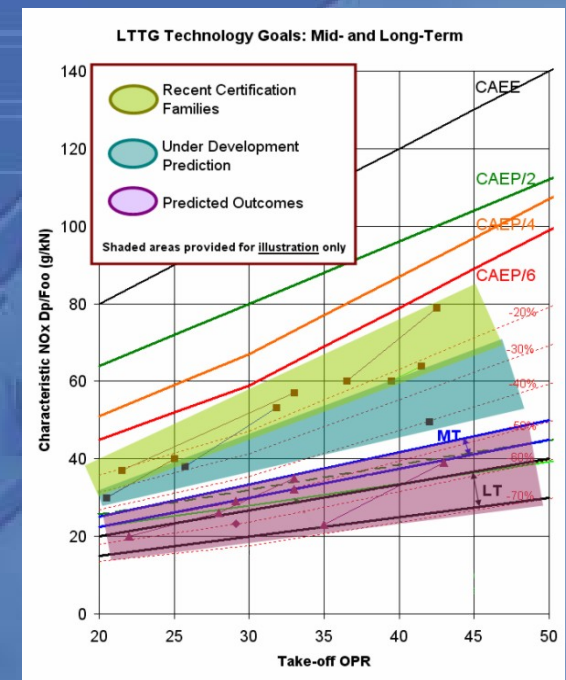
6. Evaluation of the various emissions models and databases - by June 2008
  1. AEDT/SAGE; AEM; Aero2K; and FAST
  2. Airports; Fleet; Population; and Movements
7. Goals assessment / GHG trends for 2006;2016;2026;2036 and possibly for 2050 - by June 2009 (pre-final)

May include future technology and operational improvements
8. NOx Stringency Policy Assessment (-5%; -10%; -15%; -20%; becoming effective in 31/12/2012 and 31/12/2016) - by June 2009

# MITIGATION - Technology

- ICAO continuously reviews its environmental standards, promoting more efficient, cleaner aircraft.
- Today's aircraft are 70% more fuel efficient than 40 years ago. NOx emissions have been reduced by some 40 per cent, soot and hydrocarbons virtually eliminated and continued improvement is expected.

- NOx Stringency (Annex 16) first adopted in 1981 and made more stringent in 1993, 1998 and in 2004, when ICAO adopted new Standards to be applicable in 2008, 12% lower than the existing Standards.
- NOx Technology Goals: 45% (2016) and 60% (2026) below CAEP/6





# Work in progress on technology and standards - 2010

- CO<sub>2</sub> / fuel efficiency metrics and parameters
- Fuel burn Technology Goals
- Environmental impact of alternate fuels
- New NOx Stringency (to be included in Annex 16)
- Review of NOx Technology Goals
- New Environmental Technical Manual for emissions

# Operational Measures

- Emissions savings can come from improvements in air traffic management (ATM) and other operational procedures
- Most important fuel saving opportunities come from the implementation of CNS/ATM systems - more direct routings and the use of more efficient conditions such as optimum altitude and speed
- CO<sub>2</sub> emissions are directly proportional to fuel burn
- Optimize fuel consumption = reduced emissions
- 1 tonne of fuel is equivalent to 3.16 tonnes of CO<sub>2</sub>

# MITIGATION - Operational

- Voluntary agreements template
- Circular 303
- NADP noise and emissions
- Chapter 16 Global plan
- Environmental benefits of CNS/ATM measures: Rules of Thumb / parametric model

# Work in progress on operational measures - 2010

- Fuel burn operational goals
- New guidance on CDA – Continuous Descent Arrival
- Global plan and support to regional/state implementation of the operational concept
- Guidance on computing, assessing, and reporting on aviation emissions
- Environmental indicators

# MITIGATION – Market-based measures

## ICAO HAS CONSIDERED

- Voluntary Measures
- Emissions Charges
- Emissions Trading

CAEP/5 “Economic Analysis of cost-effectiveness of Potential Market-based Options for Reduction of CO<sub>2</sub> Emissions from Aviation” (January 2001)

- *“Open emissions trading was found to be the most economically efficient approach, as compared with taxes and charges and voluntary measures for meeting the specified targets and the only viable one capable of meeting the most stringent (Kyoto Protocol) emission reduction targets*

# MITIGATION – Market-based measures

- *Voluntary Emissions:* ICAO/CAEP developed a template to facilitate voluntary agreements and collects information for the purpose of information sharing among stakeholders.
- **New** report on Voluntary Emissions Trading for Aviations
- *Emissions Trading:* **New** (Draft) Guidance document (ICAO Doc 9885) identifies a range of emission trading issues involved in including aviation in an open trading scheme.
- **New** Local Air Quality Emission Charges Guidance
- Changes to the ICAO Policy on Charges for Airports and Air Navigation Services

# Future initiatives

## Workshop on aviation and carbon markets

Montreal, 18-19 June 2008

- Discuss and familiarize participants on key issues related to aviation emissions and carbon markets. A variety of approaches including emissions trading and carbon offset programmes will be reviewed.
- Explore potential ways and means of creating a global carbon market solution for international civil aviation.

# Work in progress on market based measures - 2010

## ➤ 3 Scoping Studies

- 1. Issues related to linking GHG emissions trading schemes including aviation
- 2. Potential for emissions offset measures to mitigate effects of aviation on climate change
- 3. Potential for using emissions trading and offsets to address local air quality

## ➤ Updated Report

- 1. Report on Voluntary Emissions Trading

## ➤ Carbon Offsets

- ICAO is developing a harmonized, per-passenger emissions methodology, along with guidance on calculation methods and reference tools



# ADAPTATION

- Climate Change will impact aviation operations as we expect more intense and frequent weather events, causing e.g. delays, re-routing, and possible airport infrastructure damage

WMO/ICAO/ICCAIA – early warning and monitoring – proposal initiated by WMO/ICAO in CAEP for the further installation of sensors at aircrafts

# TECHNOLOGY TRANSFER AND FINANCING

- Under consideration by the GIACC

# OUTREACH

- **Events – ICAO/CAEP prepares workshops and CAEP experts participate in main ICAO events (e.i. Colloquium on aviation emissions)**
- **IPCC reports – ICAO/CAEP experts contributed to the Special Report and on the update of IPCC Guidelines**
- **ICAO Environmental Report – ICAO/CAEP experts provided articles and helped review the report**

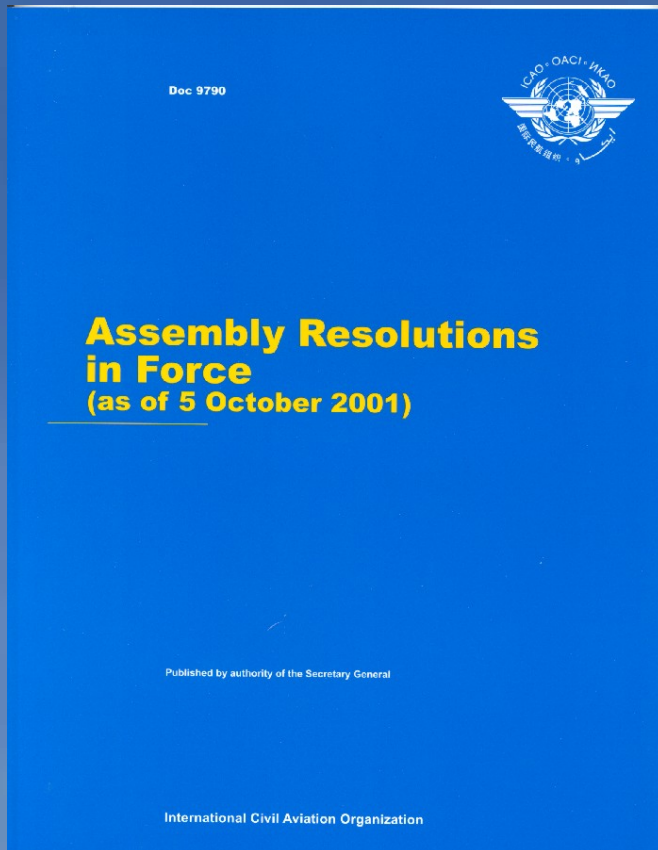
# 36th Session of the ICAO Assembly

(18 to 28 Sept 2007)

- 1488 delegates registered
- 179 Delegations
- 44 Observer Organizations

## New Env. Policy

Consolidated statement of continuing ICAO policies and practices related to environmental protection



# A36-22

➤ Appendix H: Aviation impact on local air quality

*New*

➤ Appendix I: Aviation impact on global climate – Scientific understanding

*New*

➤ Appendix J: Aviation impact on global climate – Cooperation with UN and other bodies

*New*

# A36-22

- Appendix K: ICAO Programme of Action on international aviation and climate change
- Appendix L: Market-based measures, including emissions trading

*New*

*New*

# ICAO's mandate within the UN

## A36-22 ( J ): Aviation impact on global climate - Cooperation with UN and other bodies

- Ensure that ICAO exercises continuous leadership on environmental issues relating to international civil aviation, including GHG emissions
- Continue to study policy options to limit or reduce the impact of aircraft engine emissions, to develop concrete proposals and provide advice as soon as possible to the Conference of the Parties of the UNFCCC
- Continue to cooperate with organizations involved in policy-making in this field, notably UNFCCC and SBSTA

# Programme of action on International Aviation and Climate change (Appendix K)

- **Group on International Aviation and Climate Change (GIACC)**
  - **Senior Government Officials**
  - **Aggressive Program of Action**
  - **Implementation Framework: strategies and measures that States can use to achieve emissions reductions**
    - **Voluntary measures**
    - **Effective dissemination of technology**
    - **More efficient operational measures**
    - **Improvements in air traffic management**
    - **Positive economic incentives**
    - **Market-based measures**

# Group on International Aviation and Climate Change (GIACC)

- GIACC/1 (Feb 08) reviewed aviation emissions-related activities within ICAO and internationally
  - GHG on going activities in CAEP
  - Cooperation with UN Bodies (UNFCCC/IPCC)
  - Information on National/regional activities
  - Information from Industry on possible actions to reduce aviation emissions (airlines; airports; air navigation services; and business aviation);
  - Discussion and exchange of views on elements of a framework for action;
  - Aspirational goals
  - Future Schedule



# Future Schedule - GIACC and AWGLCA

## ICAO/GIACC PROCESS

GIACC/1 – 25-27 Feb08

GIACC/2 – 14-16 Jul08

GIACC/3 – 16-18 Feb09

GIACC/4 – 1-3 Jun09

High Level Meeting in  
connection with  
COP/15 (date tbd)

CAEPSG/2-Sept08

CAEPSG/3-Jun09

CAEP/8-Feb10

## UNFCCC/AWGLCA PROCESS

AWGLCA/1 – 31Mar-4Apr08

AWGLCA/2 – 2-13 Jun08

AWGLCA/3 – Aug/Sept08

AWGLCA/4 – 1-12 Dec08

AWGLCA/5 – Mar09

AWGLCA/6 – 1-12Jun09

AWGLCA/7 – Aug/Sept09

AWGLCA/8 – 30Nov-11Dec09

(COP/15)

WORKSHOPS/INFORMAL  
GROUPS



**ICAO  
Environmental  
Report 2007**



**Thank you!**

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information:**

**ICAO Web Page**

**[www.ICAO.int/](http://www.ICAO.int/)**

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