Aviation and Sustainable Development: Trends and Issues

United Nations – Division for Sustainable Development
Expert Group Meeting on Transport for Sustainable Development

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August 28, 2009
International Civil Aviation Organization (ICAO)

- UN specialized agency
- Established by the “Chicago Convention” in 1944
- Forum for cooperation in all fields of civil aviation
- 190 Contracting States and 86 int. orgs
- Policies, Standards & regulations for environmental protection since early 70’s
- Focus on aircraft noise, LAQ and global climate
Global Climate Change Challenge

- Achieve balance between future growth and environmental impacts;
- Accommodate States’ differing views within a harmonized worldwide approach;
- Transform barriers into opportunities;

“Climate change is one of the greatest environmental challenges facing our planet”
ICAO’s work on Environment

- **Key Strategic Objective:**
  - minimize the adverse effect of global civil aviation on the environment

- **Standards:**
  - Annex 16 - Environmental Protection
    - Volume I – Aircraft Noise
    - Volume II – Aircraft Engine Emissions

- **ICAO GHG goal:**
  - to limit or reduce the impact of aviation GHG emissions on global climate
ICAO’s Actions

- ICAO is actively pursuing the reduction of aviation environmental impact through:
  - Standards
  - Operational measures
  - Market-based options

- Due consideration given to:
  - Environmental benefit
  - Technical feasibility
  - Economic reasonableness
  - Interdependencies
Achievements and Prospects

- 40 per cent reduction in engine fuel consumption
- 70 per cent reduction in aircraft fuel burn per seat
- Declining trends in operational fuel consumption rates
- More to come…
Aircraft Fuel Efficiency Improvement

Figure 9-3: Trend in transport aircraft fuel efficiency.

IPCC Special Report on Aviation And the Global Atmosphere
Fuel Consumption Rates: Trends on International Scheduled Services

![Graph showing fuel consumption trends from 1990 to 2008 for liters of fuel per 100 RTK and liters of fuel per 100 ATK.](image)
Fuel Consumption Rates: Trends on Domestic Scheduled Services

[Graph showing trends in liters of fuel per 100 RTK and liters of fuel per 100 ATK from 1990 to 2008 with a decreasing trend over time.]
Fuel Consumption Rates: Trends on Total Scheduled Services

- liters of fuel/100 RTK
- liters of fuel/100 ATK

Graph showing the trend of fuel consumption rates from 1990 to 2008.
More than 44,000 New Aircraft

Number of aircraft

- Replacement
- Growth
- Retained in service

2006: 18,773
2016: 25,906
2026: 47,503
2036: 44,466
Younger Fleet Expected

- The commercial aircraft fleet is expected to increase to about 47,500 by 2036
- More than 44,000 (94%) aircraft will be new generation

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<th>Replacement</th>
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Technology and Standards

- Mid and long term goals (10 and 20 years)
  - NOx in 2006
  - Fuel Burn/CO$_2$ and Operations in 2009
- Emissions Standards
  - NO$_x$, HC, CO and smoke since early 80’s
  - Increased stringency of NOx Standard by about 40%
- Work ongoing on Particulate Matter (PM) Standards
- Fuel efficiency metric and CO$_2$ Standard expected in near future
Operational Measures

- Emissions savings can come from improvements in air traffic management (ATM) and other operational procedures
  - ICAO Circular 303: aircraft weight and drag reduction, optimum route / altitude / speed selection, etc.
  - Global Air Navigation Plan (Doc 9750) for CNS/ATM
  - ICAO Circular on NADP Noise and Emissions Effects

Work in progress on:
- Goal-setting for operational fuel burn
- Replacement of Circular 303 with updated information and new provisions
- New guidance with CDA (Continuous Descent Approach)
Market Based Measures

- Voluntary Measures
  - A template for agreements between government and industries
  - Collection and sharing of Information on voluntary activities

- Emissions Charges
  - Guidance on LAQ emissions charges (Doc 9884)
  - Legal/policy issues exist on CO2 emissions charges

- Emissions Trading
  - Guidance on inclusion of international aviation into an open ETS (Doc 9885)

Work in progress on:
- ✓ Study on issues related to linking open emissions trading schemes including aviation
- ✓ Study on potential for emissions offset measures to mitigate effects of aviation on climate change
ICAO Programme of Action to address International Aviation and Climate Change

- A high-level Group on International Aviation and Climate Change (GIACC), consisting of 15 senior government officials with the equitable participation of developing and developed States formed by the ICAO Assembly in 2007

- Developed a global framework through an aggressive ICAO Programme of Action on International Aviation and Climate Change with its 3 key elements of:
  - Global aspirational goals for international aviation sector;
  - Measures taken by States to reduce aviation emissions; and
  - Monitoring and implementation framework (reporting mechanism)

- An ICAO High Level Meeting will be held in Oct 2009 to finalize the Programme of Action for presentation at UNFCCC COP/15 in Dec 2009
Alternative Fuels for aviation

- Given sufficient demand or incentive, significant supplies of Jet fuel that offer a 50% or more reduction in lifecycle CO₂ emissions could be available in 15 years.
- Could be a win-win solution in reducing aviation’s dependence on fossil fuels and helping to reduce the impact of aviation on climate change:
  - A number of successful in-flight demonstrations of alt fuel have been conducted:
  - ASTM International/DEFSTAN certification for blends of alt fuels underway

- ICAO leading the way towards a Globally Harmonized Roadmap on Aviation Alternative Fuels
- A workshop in Feb 2009 paved the way by assembling a knowledge-base for the state-of-the-art in aviation alternative fuels
- A Conference will be held in Nov 2009 in Brazil with the aim to develop a globally harmonized roadmap involving all stakeholders
ICAO Carbon Emissions Calculator

- Internationally approved
- Transparent
- Easy-to-use
- Publicly available
- Delivers consistent estimates of CO₂ – suitable for use with offset programs

Here is your footprint

1 passenger, flying one way from MONTREAL (YUL) to NEW YORK, NY (LGA) (523 Km), in Economy Class, generates about **89.85 Kg** of CO₂

More information for you:

Route: from MONTREAL (YUL) to NEW YORK, NY (LGA) (523 Km)

- This itinerary is served by the following aircraft: 100, 320, CR2, CR9
- Each flight consumes an average of 1,801 Kg of fuel
- The average number of seats per flight is 89
- The average CO₂ emitted per passenger is 89.85 Kg
Conclusions

- Air transport is a fast, reliable mode of transport with no comparative alternative for long distance travel.
- On a per-flight basis, efficiency is expected to continue to improve through 2050.
  
  But… even under the most aggressive technology forecast scenarios, this anticipated gain in efficiency from technological and operational measures does not offset the expected growth in demand driven emissions.

- A multi-faceted approach toward sustainability is possible from:
  - Technological advances
  - Operational Improvements
  - Market based measures
  - Alternative fuels

- ICAO High Level Meeting in Oct 2009 will deliver a Programme of Action to address International Aviation’s contribution to climate change in time for UNFCCC COP/15.