The Path to Sustainable Aviation

The future of air transport as a catalyst for the economic, social and cultural development of our global society is directly related to our collective ability to reach and maintain the sustainability of international civil aviation operations worldwide.

Roberto Kobeh González, President of the Council of the International Civil Aviation Organization

Sustainable Alternative Fuels for Aviation

As the UN specialized agency for international civil aviation, ICAO has, for more than 40 years, excelled in bringing the international community together around increasingly stringent regulations for aircraft noise and emissions. As a result, air transport operations today are 70% more fuel efficient and 75% quieter than they were 40 years ago.

ICAO's 37th Assembly Resolution

The global agreement reached at the 37th Assembly reflects the collective determination of ICAO's member States to contribute to the global efforts on climate change, and provides an ambitious work programme to continue on the path towards sustainable future of international aviation.

ICAO's Leadership: A History of Consensus and Action

Sustainable alternative fuels for aviation offer one of the most exciting and promising opportunities for reducing aviation's greenhouse gas emissions while improving local air quality.

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- Publicly available
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### ICAO Agreement on International Aviation and Climate Change

During the last three years, ICAO has been especially active in developing a global strategy to address international aviation and climate change. The decision by the 36th Session of the ICAO Assembly in 2007 which called for the development of an aggressive programme of action on climate change created the momentum for ICAO to make landmark achievements in addressing this issue.

With the global agreement reached at the 37th Session of the ICAO Assembly in October 2010, international aviation is the first sector with a shared global commitment to environmental goals of increasing fuel efficiency and stabilizing its global CO2 emissions in the medium term.

ICAO member States together with industry have also agreed on an ambitious work programme to continue on the path towards sustainability.

### Main Provisions of the ICAO Resolution on International Aviation and Climate change
- Further endorsement of the global aspirational goal of 2% annual fuel efficiency improvement up to year 2050.
- A medium-term global aspirational goal from 2020 that would ensure that while the international aviation sector continues to grow, its global CO2 emissions would be stabilized at 2020 levels.
- Further work to explore the viability of a long-term global aspirational goal for international aviation.
- Development of a framework for market-based measures, including further elaboration of the guiding principles adopted by the Assembly in the exploration of a global scheme for international aviation.
- Concrete steps to assist States in contributing to the global efforts.
- De minimis provisions to ensure that States with small contributions to the global air traffic are not burdened disproportionately.
- States’ action plans, covering information on CO2 emissions reduction activities and assistance needs.

### What’s Next?

**From Policy to Implementation**
- The outcome of the 37th Assembly shifts ICAO’s role from policy setting to implementation mode.

**ICAO and its member States committed to work together to achieve their collective global goals through:**

- **A multi-faceted approach** — a basket of mitigation measures from which States can choose to contribute to reaching the global goals:
  - **Green aircraft technologies**
    - Fuel renewals; lighter materias; higher engine performance; aerodynamic improvements; new emissions certification Standards, etc.
  - **Operational measures**
    - Air traffic flow management; dynamic and flexible route management; terminal area management; airports design and management, performance based navigation, etc.
  - **Market-based measures**
    - Emission trading, charges, carbon offsetting... under ICAO’s framework, and a future global scheme.
  - **Alternative fuels for aviation**
    - Sustainable drop-in fuels (jatropha, camelina, algae, etc.)

**States’ voluntary action plans and enhanced assistance to States:**
- Just as global air transport assures the highest level of safety and security as a result of ICAO’s Audit Programmes, these action plans on aviation and climate change will allow States to identify their mitigation measures and assistance needs, and enable ICAO to monitor progress towards reaching the global goals and address specific needs of States.
- ICAO is developing guidance, will conduct training to assist States in the preparation of their action plans and will facilitate the provision of technical and financial assistance.

**What’s Next?**
- Reviewing the progress feasibility of global aspirational goals.
- Developing the framework for market-based measures.
- Elaborating on the de minimis provision is market-based measures.
- Assisting States in their preparation of action plans.
- Facilitating the provision of technical and financial assistance to States.
- Facilitating the development and deployment of sustainable alternative fuels for aviation.
- Enhancing cooperation with UN and other international bodies.

### Fuel Consumption and Fuel Efficiency

<table>
<thead>
<tr>
<th>Year</th>
<th>Fuel Consumption (Mt)</th>
<th>Fuel Efficiency (Fuel per RTK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>250</td>
<td>13%</td>
</tr>
<tr>
<td>1992</td>
<td>260</td>
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<td>1994</td>
<td>270</td>
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<td>2006</td>
<td>330</td>
<td>21%</td>
</tr>
<tr>
<td>2008</td>
<td>340</td>
<td>22%</td>
</tr>
<tr>
<td>2010</td>
<td>350</td>
<td>23%</td>
</tr>
</tbody>
</table>

### Future CO2 Trends

- **ICAO Assembly improves aviation cleanliness, safety security.**
  - **“A step in the right direction… Very significant.”**
    - European Union
  - **“A platform to set a global vision… a step forward”**
    - Airports Council International
  - **“Shared global vision… a step forward”**
    - IATA
  - **“Welcome first step”**
    - Civil Air Navigation Services Organisation
  - **“Unprecedented commitment”**
    - US Department of State
  - **“Breakthrough…”**
    - GreenAirOnline.com

### Trends and Mitigation Options for International Aviation

- Aircraft engine emissions. Standards set by ICAO and the investments in technologies and improved operational procedures allow aviation’s CO2 footprint to grow at a rate slower than the demand for air travel. Efficiency is expected to continue to improve.

- **Main Provisions of the ICAO Resolution on International Aviation and Climate change**
  - **Further endorsement of the global aspirational goal of 2% annual fuel efficiency improvement up to year 2050.**
  - **A medium-term global aspirational goal from 2020 that would ensure that while the international aviation sector continues to grow, its global CO2 emissions would be stabilized at 2020 levels.**
  - **Further work to explore the viability of a long-term global aspirational goal for international aviation.**
  - **Development of a global CO2 Standard for aircraft entering from 2013.**
  - **Development of a framework for market-based measures, including further elaboration of the guiding principles adopted by the Assembly in the exploration of a global scheme for international aviation.**
  - **Concrete steps to assist States in contributing to the global efforts.**
  - **De minimis provisions to ensure that States with small contributions to the global air traffic are not burdened disproportionately.**
  - **States’ action plans, covering information on CO2 emissions reduction activities and assistance needs.**

- **States’ voluntary action plans and enhanced assistance to States:**
  - **Just as global air transport assures the highest level of safety and security as a result of ICAO’s Audit Programmes, these action plans on aviation and climate change will allow States to identify their mitigation measures and assistance needs, and enable ICAO to monitor progress towards reaching the global goals and address specific needs of States.**
  - **ICAO is developing guidance, will conduct training to assist States in the preparation of their action plans and will facilitate the provision of technical and financial assistance.**
The Focus on Climate Change

Sound Policies based on Sound Information
Total CO₂ emissions from aviation (domestic and international operations) currently account for approximately 2%, of total global CO₂ emissions. (IPCC 4th Assessment Report in 2007, approximately 60% of that 2% are from international aviation (H.275).

Globally
Transport Sector Focus

Road Vehicles: 74%

Fuel Consumption (Mt)

Sector Focus
Global GHGs

Sound Policies based on Sound Information

Wastewater
Waste and Vaccinates

Aircraft engine emissions’ Standards set by ICAO and the investments in technologies and improved operational procedures

Aviation
Buildings
Forestry Industry
Energy Supply

All Other Sources: 98%

Aviation

10% 13% 8% 17% 19% 26% 3% 14%

Other
International Aviation: 60%
Domestic Aviation: 40%

Future CO₂ Trends

Fuel Efficiency (Fuel per RTK)

Aviation

Future CO₂ Trends

Fuel Efficiency (Fuel per RTK)

Future CO₂ Trends

Fuel Efficiency (Fuel per RTK)

Main Provisions of the ICAO Resolution on International Aviation and Climate change

• Further endorsement of the global aspirational goal of 1% annual fuel efficiency improvement up to year 2030.
• A medium-term global aspirational goal from 2030 that would ensure that while the international aviation sector continues to grow, its global CO₂ emissions would be stabilized at 2020 levels;
• Further work to explore the feasibility of a long-term global aspirational goal for international aviation;
• Development of a global CO₂ Standard for aircraft arising in 2013;
• Development of a framework for market-based measures, including further elaboration of the guiding principles adopted by the Assembly in its consideration of the mitigation options for aviation; and
• Concrete steps to assist States in contributing to the global effort;
• De minimis provisions to ensure that States with small contributions to the global air traffic are not burdened disproportionately;
• States’ action plans, covering information on CO₂ emissions reduction activities and assistance needs.

ICAO Agreement on International Aviation and Climate Change
During the last three years, ICAO has been especially active in developing a global strategy to address international aviation and climate change. The decision by the 36th Session of the ICAO Assembly in 2007 which called for the development of an aggressive programme of action on climate change created the momentum for ICAO to make landmark achievements in addressing this issue.

With the global agreement reached at the 37th Session of the ICAO Assembly in October 2010, international aviation is the first sector with a shared global commitment to environmental goals of increasing fuel efficiency and stabilizing its global CO₂ emissions in the medium-term.

ICAO member States together with industry have also agreed on an ambitious work programme to continue on the path towards sustainability.

Trends and Mitigation Options for International Aviation

Although the contribution of aviation operations to total global CO₂ emissions is relatively small, forecasted traffic growth (4%-5% per year) raises serious questions on the future contribution of aviation activity to climate change and on the most effective way to reduce CO₂ emissions from the sector.

Fuel Consumption and Fuel Efficiency

Future CO₂ Trends

International Aviation: 60%
Domestic Aviation: 40%

ICAO Agreement on International Aviation and Climate Change

"A step in the right direction… Very significant."
European Union

"Welcome first step"— Civil Air Navigation Services Organisation

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ICAO and its member States committed to work together to achieve their collective global goals through:

• Promises of innovations, air traffic flow management, dynamic and flexible route management, terminal area management, emissions design and management, performance based navigation, etc...
• Green aircraft technologies
  • Feed renewals, lighter materials, higher engine performance, aerodynamic improvements
  • Emission certification Standards, etc…
• Operational measures
  • Reductions in operations, air traffic flow management, dynamic and flexible route management, terminal area management, emissions design and management, performance based navigation, etc…
• Market-based measures
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**Aviation Globally**

Although the contribution of aviation operations to total global CO2 emissions is relatively small, forecasted traffic growth will continue to grow its global CO2 emissions would be stabilized at 2020 levels;

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- No comparative alternative transport to road or rail

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Focus on:

To limit or reduce:

- the number of people affected by significant aircraft noise
- the impact of aviation emissions on local air quality
- the impact of aviation greenhouse gas emissions on the global climate

Environment

International Civil Aviation Organization (ICAO)

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www.icao.int

Sustainability Goals

No comparative alternative transport to road or rail

Fast, reliable and safe mode of transport
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