ICAO Technology Goals Process for Aviation Environmental Protection

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Agenda

- ICAO Goals for Environment
- Technology Standards
- Technology and Operations Goals
ICAO Strategic Objective for Environment

Minimize the adverse effect of global civil aviation on the environment
ICAO Environmental Goals

- Limit or reduce the impact of aviation GHG emissions on global climate
- Limit or reduce the number of people affected by significant aircraft noise
- Limit or reduce the impact of aviation emissions on local air quality

Quantify and Mitigate
Establishing Technology Standards
Technology Standards

Looking Back: Based on established technology

Looking Forward: Generally applies to new designs
ICAO Technology Standards for NOx

Ref: Independent Experts NOx Review and the Establishment of Medium and Long Term Technology Goals for NOx (ICAO Doc 9887), 2006. CAEP/8 Standard line superimposed.
ICAO Technology Standards for Noise

Cumulative Noise Levels of Best Practice Aeroplanes
(2, 3 and 4-Engine Aeroplanes)

Ref: Review and Analysis of Certification Noise Levels for Subsonic Jet and Heavy Propeller Aeroplanes. CAEP/8 WP/33
Establishing Goals
Technology and Operations Goals

Looking Forward: Based on the leading edge of technology

Looking Beyond: GOALS ≠ PROJECTIONS
Goals Setting in CAEP

- NOx Reduction Technologies (2006, 2009)
- Environmental Benefits from Operational Initiatives (2010)
- Fuel Burn Reduction Technologies (2010)
Goals Setting in CAEP

- Independent Experts Panels
  - Broad representation
  - Manageable number
  - “Independent”

- Common Assumptions
  - Baselines
  - Aircraft Categories
  - Realization Factors
Technology and Operations Goals

Balance environmental benefit with technological feasibility, economic viability, and do not adversely impact other environmental factors.

Provide stretch targets for industry R&D to aim at in cooperation with States.

**Purpose**

- Use the same metric as certification to enable direct comparison
- Technology Goals based on Current TRL < 8 technologies that will be TRL>8 at a given time
- Technology availability with at least one manufacturer
- Technology availability specific to the seat-class considered
ICAO Technology Goals for NOx

Mid Term (2016)

• 45% ± 2.5% below CAEP/6 @ OPR 30

Long Term (2026)

• 60% ± 5.0% below CAEP/6 @ OPR 30

Ref: Independent Experts NOx Review and the Establishment of Medium and Long Term Technology Goals for NOx (ICAO Doc 9887), 2006
ICAO Technology Goals for Noise

### Aircraft Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Mid-Term (2018)</th>
<th>Long-Term (2028)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Jet</td>
<td>13.0±4.6</td>
<td>20.0±5.5</td>
</tr>
<tr>
<td>Twin</td>
<td>21.0±4.6</td>
<td>23.5±5.5</td>
</tr>
<tr>
<td>Long-Range Twin</td>
<td>20.5±4.6</td>
<td>23.0±5.5</td>
</tr>
<tr>
<td>Long-Range Quad</td>
<td>21.0±4.6</td>
<td>23.5±5.5</td>
</tr>
</tbody>
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### References

A wish for more fuel-efficient aircraft versions seems to be overtaking the traditional emphasis of keeping maximum commonality across fleets

Concern about likely increased costs of new technology and possible changes in infrastructure
Independent Expert Led Reviews for Technologies – Operational Initiatives

• The global civil ATM system goal is to achieve an average of 95% operational efficiency by 2026*
• Agreement to continue this effort during the CAEP/9

* The goal has a lot of caveats associated with it and should not be used in isolation
ICAO Environmental Policy Framework
Climate Change, Local Air Quality, Noise

ICAO Environmental Goals (International Aviation)

Status, Projections and Trends

Technology and Operations Goals

Global Harmonization through Standards and Recommended Practices

Goals & Standards – Quantify & Mitigate
QUESTIONS?