



**GROUP ON INTERNATIONAL AVIATION AND CLIMATE CHANGE (GIACC)
THIRD MEETING**

Montréal, 17 to 19 February 2009

Agenda Item 2: Review of aviation emissions related activities within ICAO and internationally

Parallels between Noise and CO2 Environmental Goals

(Presented by the Secretariat)

1. INTRODUCTION

1.1 There have been several discussions during GIACC/1 and GIACC/2 on the subject of potential application of CBDR (Common But Differentiated Responsibilities) principle to aviation. More specifically, during GIACC/2, it was recalled that in the 1990s for phase-outs related to aircraft noise, ICAO had developed a special way of accommodating the needs of developing countries, e.g. where the latter were given more time to comply with ICAO's overall policy. A suggestion was made that the Secretariat prepare a paper describing the process which the Organization had implemented with regard to aircraft noise and outlining the parallels with aviation emissions.

1.2 The following section summarizes how noise-related phase-outs of Chapter 2 aircraft were handled. Some similarities and differences between the noise-then and emissions-now are then offered. It is hoped that lessons learned from noise can help in discussions of alternatives to deal with the current emissions issues facing aviation.

2. NOISE PHASE-OUT OF CHAPTER-2 AIRCRAFT

2.1 Aircraft operating restrictions were first considered by ICAO about 20 years ago. The extraordinary session of the Assembly in 1990 established a global framework for the phase-out¹ of Chapter 2 aircraft. According to the then President of the Assembly, the resolution represented a careful balance between the interests of developing and developed States and took into account the concerns of the airline industry, airports and environmental interests.

2.2 States with serious airport noise problems were allowed to implement the phase-out progressively over a seven year period beginning on 1 April 1995 and ending on 1 April 2002. The special circumstances of developing nations' airlines had to be taken into account through limited economic hardship exemptions, up to 2005.

2.3 Most developed countries were designated as Noise Restricted States while the remaining areas of the world were classified as Non-Restricted States or Areas. Noise Restricted States could ask

¹ A phase-out is defined as withdrawal of a noise-based category of aircraft from international operations at all airports in one or more States.

their airlines to replace their older Chapter 2 aircraft with newer, noise compliant Chapter 3 aircraft by 2002. These airlines were not permitted to purchase Chapter 2 aircraft (non-addition rule).

2.4 The following is a summary of recommendations to the ICAO member States regarding their Chapter-2 phase-out plans:

- Do not require a Chapter 2 phase-out to start before April 1, 1995;
- Do not require a total Chapter 2 phase-out before April 1, 2002;
- Do not require a phase out of Chapter 2 airplanes less than 25 years old;
- Exempt Chapter 2 airplanes with high by-pass ratio until at least April 1, 2002; and
- Exempt Chapter 2 wide-body airplanes until at least April 1, 2002.

2.5 Furthermore the Assembly “urged States to assist aircraft operators in their efforts to accelerate fleet modernization and thereby prevent obstacles and permit all States to have access to lease or purchase of aircraft compliant with Chapter 3, including the provision of multilateral technical assistance where appropriate”.²

2.6 The Assembly also “urged the ICAO Council to promote and States to develop an integrated approach to the problem of aircraft noise , including land-use planning procedures around international airports, so as to minimize the adverse effect of aircraft noise on any residential, industrial or other land-use”.²

2.7 The preceding statement led to development of the ICAO Balanced Approach. This approach consists of identifying the noise problem at an airport and then analysing the various measures available to reduce noise using four principal elements, namely:

- reduction at source;
- land-use planning and management;
- noise abatement operational procedures; and
- aircraft operating restrictions.

2.8 The goal is to address the local noise problem in the most cost-effective manner, on the understanding that the solutions need to be tailored to the specific characteristics of the airport concerned. Similar solutions should, therefore, be applied if similar noise problems are identified at different airports.

2.9 The Balanced Approach calls for the reconciliation, as far as practicable, of two opposite parameters: on the one hand, noise mitigation measures have to meet local requirements that can vary from one airport to another and on the other hand, the selected measures have to be universal enough to satisfy the global requirements of airlines and manufacturers who cannot modify their services or products beyond certain limits.

2.10 According to the Balanced Approach, only airports with documented noise problems are entitled to take specific measures. Furthermore, these measures must be the most cost-effective ones and must fall within the four principal elements of the Balanced Approach.

2.11 Moreover, ICAO recommends against applying operating restrictions as a first resort, i.e. the other elements of the Balanced Approach should be considered first. If operating restrictions are considered, they should:

- be based on the noise performance of the aircraft, according to Annex 16 — *Environmental Protection*, Volume I — *Aircraft Noise*;
- be limited to restrictions of a partial nature wherever possible, rather than the complete withdrawal of operations and introduced gradually over time, giving

² Direct quotes from www.icao.int/icao/en/nr/1990/pio199011_e.pdf “ICAO Assembly concludes with agreement on all issues (October 1990).”

- operators a reasonable period of advance notice;
- take the possible consequences for air services without any suitable alternative into account and consider the special circumstances of operators from developing countries.

3. PARALLELS FOR CARBON EMISSIONS - GOALS

3.1.1 The noise phase-out was implemented to achieve a balance of local and global goals. For noise, both goals have been traditionally described in terms of number of people exposed to certain levels of noise. More specifically, ICAO goal for noise is to “limit or reduce the number of people exposed to significant aircraft noise.” The corresponding ICAO goal for GHG emissions is to “limit or reduce the impact of GHG emissions on the global climate.”

3.1.2 The metric for significant aircraft noise is almost universally agreed to be an average day-night level (DNL) expressed in decibels. Thresholds can be defined based on different levels of impact (e.g. 55, 60 or 65dB). For carbon emissions, GIACC is heading towards an aspirational goal defined in terms of efficiency (e.g. RTK/litre or ATK/litre). Both forms of goals are non-binding and non-attributable (i.e. defined in terms where responsibility cannot be directly attributed to any one party).

NOISE		GHG EMISSIONS	
Limit or reduce		Limit or reduce	
The number of people	DNL Noise contours converted into population	The impact on the global climate	Science working to convert mass/efficiency into impact
Affected by Significant aircraft noise	Metric agreed to be DNL (contours)	of Aviation GHG emissions	Metric seems to be efficiency

3.1.3 In both cases, aspirational goals, whether at the “local” level or global level, can be set in terms of the defined metric. The “local” level for noise has traditionally been at the airport level but it could equally be applied at the State level. “Local” for GHG emissions could be translated as domestic aviation whereas “global” could stand for international aviation.

4. PARALLELS FOR CARBON EMISSIONS - MECHANISMS TO PROGRESS TOWARD GOALS

4.1 Once a goal (aspirational or otherwise) has been agreed upon, there is a need to measure progress against it. For noise, this has been done by trends analysis with the use of a robust modelling framework. In such a model, regulatory measures (e.g. design Standards) and growth projections (e.g. technology, growth) are combined to determine trends against goals. This trends analysis, in turn, helps policy makers consider mechanisms to improve environmental indicators. The following paragraphs summarize various mechanisms available to policy makers.

4.2 **Global Regulatory Schemes:** The primary mechanism in this regard is establishment of a design standard. For noise, the standard is established in terms of EPNL (Effective Perceived Noise Level) measured at three flight conditions. For GHG emissions, it could be an aircraft efficiency standard (quantifiable and attributable to a single aircraft). Once a standard is established, other supporting mechanisms such as phase-outs or production cut-offs can be considered if more accelerated progress is required and if a cost-benefit analysis warrants such a scheme.

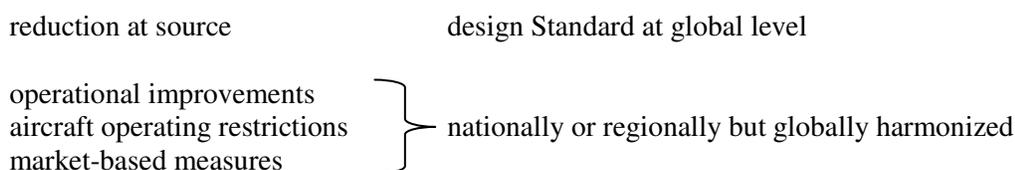
4.3 **“Local” Mitigation Rules:** For noise, this consisted of operational procedures, land-use planning, and, as a last resort, operating restrictions. Clearly, land-use planning does not contribute to lowering GHG emissions. However, there may be room for improved operational procedures and potential implementation of operating restrictions.

4.4 **Market Based Measures:** Some airports have used charges as a way to discourage operation of noisier aircraft. For domestic aviation, it may be possible to use this to discourage less carbon-efficient aircraft. In addition, off-sets have the potential of reducing carbon footprint of emissions. Cap and trade systems could also be considered in this regard. All these measures, of course, need wide agreement and need to be done in a globally harmonized fashion that is aligned with ICAO policies.

4.5 The following table summarizes the applicability of the above-mentioned mechanisms:

	USED FOR NOISE	POTENTIAL FOR CO2
“Global” Regulatory Schemes		
Stringency Standards	X	Yes
Phase-outs	X	No?
Production Cut-offs		Yes?
“Local” Mitigation Rules		
Operating Restrictions	X	Yes?
Operational Procedures	X	Yes
Land Use Planning and Management	X	No
Market Based Measures		
Cap and Trade Systems		Yes
Off-set Schemes		Yes
Airport Charges	X	Yes?

4.6 **“Balanced Approach” for GHG Emissions?:** A Balanced Approach along the line of that developed for aircraft noise may consist of identifying the GHG emissions problem and then analysing the various measures available to reduce it using four principal elements, namely:



4.7 It is important to note that even before the balanced approach discussions started for noise, a robust policy framework based on objectives with quantifiable metrics and a design Standard was already in place.

5. CONCLUSIONS

5.1 Parallels between policy frameworks for aviation noise and GHG emissions are drawn in this paper. Lessons learned from noise have been described in terms of distinguishing between local and global policy options (domestic and international) that provide flexibility to States to cater to their own specific needs while working within a globally harmonized approach.