



Agenda Item 8: Environment Matters

SUMMARY OF CAEP WORK

(Presented by the Secretariat)

SUMMARY This paper provides an overview of the work of ICAO's Committee on Aviation Environmental Protection (CAEP). It summarizes ongoing work on CAEP's environmental initiatives related to the assessment and mitigation of noise and local air quality concerns in the vicinity of airports. It also provides an update on operational measures for reducing aviation's contribution to noise, emissions that affect local air quality, and greenhouse gas emissions. In addition, activities between now and the CAEP/8 meeting, currently planned for February 2010, are outlined.	
References: • Annex 16, Volumes I and II • Report of the Committee on Aviation Environmental Protection, Seventh Meeting (Doc 9886)	
<i>Strategic Objectives</i>	<i>This working paper is related to Strategic Objectives C1 and C2.</i>

1. INTRODUCTION

1.1 The Committee on Aviation Environmental Protection (CAEP) was established by the ICAO Council in 1983, superseding the Committee on Aircraft Noise (CAN) and the Committee on Aircraft Engine Emissions (CAEE). CAEP is a technical committee of the ICAO Council that has 24 Members and 13 Observers, and approximately 400 experts that are involved in the overall activities that are of a highly technical nature.

1.2 Full CAEP meetings are held every 3 years during Assembly years (typically in February and always before the Assembly). The work programme and organizational structure is established at each full CAEP meeting for the next triennium. The eighth CAEP (CAEP/8) meeting will take place from 1 to 12 February 2010. A CAEP Steering group meets once a year to review the work and adjust the CAEP work programme, if necessary.

1.3 The current structure of CAEP includes 3 working groups, 2 task forces, and 1 support group. These are: WG1 – Noise Technical Issues, WG2 – Operational Issues, MODTF – Modelling and Databases Task Force, MBMTF – Market Based Measures Task Force, and FESG – Forecasting and Economics Support Group, WG3 – Emissions Technical Issues. These working groups and task forces meet periodically, typically around 2 to 3 times per year.

1.4 CAEP and its working groups continue to provide support for the ICAO goals of limiting or reducing the impact of greenhouse gas emissions from aviation. At the same time, CAEP has continued to make progress on the other two fronts of limiting or reducing the number of people exposed to significant aircraft noise and of limiting or reducing emissions affecting local air quality. A status report on the main CAEP activities and deliverables in all three areas, viz., greenhouse gas emissions, local air quality emissions, and noise is presented in this paper.

2. SUMMARY OF CAEP WORK

2.1 Extensive preparatory work has been undertaken since the CAEP/7 meeting in February 2007. More than twenty meetings at the working group/task force level, and numerous teleconferences, in addition to the Steering group meetings, have been held. All the studies being carried out are being extensively documented for presentation at the CAEP/8 meeting in February 2010. CAEP has also adjusted its work programme and worked on tasks arising from the Group on International Aviation and Climate Change (GIACC) process, including trends assessment and studies related to fuel burn reduction measures.

2.2 Proposals for amendments to Annex 16 and supporting studies

2.2.1 The CAEP WG3 (emissions technical working group) has done considerable analysis of several NO_x stringency policy options. A decision is expected to be reached during the CAEP meeting on amending Annex 16, Vol II – *Environmental Protection, Aircraft Engine Emissions*. At the same time, an Environmental Technical Manual (ETM) has been drafted to describe the procedures for emissions certification of aircraft engines along the lines of the existing document for noise. Policy options for production cut-off based on NO_x emissions have also been examined for presentation to CAEP/8.

2.2.2 Analysis of the state-of-the-art technologies in noise reduction is being carried out by the CAEP WG1 (noise technical working group), but no increase in stringency is expected at CAEP/8. However, several aspects related to the applicability language have been addressed to ensure a consistent process in all States. Such proposals to clarify the text in Annex 16, Vol I – *Environmental Protection, Aircraft Noise*, are expected to be finalized at CAEP/8. The *Environmental Technical Manual on the use of Procedures in the Noise Certification of Aircraft* (Doc 9501) has been extensively revised with the purpose of consolidating all incremental changes over the years.

2.2.3 CAEP has continued to explore the development of a CO₂ Standard for aircraft and this issue will be further considered in the next CAEP cycle. A fuel efficiency metric has also been agreed which uses the product of payload and distance as the denominator with fuel mass used as the numerator (Commercial Aircraft System Fuel Efficiency Metric = Fuel Mass Consumed / Payload × Distance). A methodology is under development to account for complete life cycle analyses of any alternative fuels.

2.3 Goals for Environmental Improvement from Technology and Operational Initiatives

2.3.1 Under the CAEP process, substantial work has been undertaken to establish medium (10 years) and long-term (20 years) environmental goals relating to three types of technologies, viz., noise, NO_x, and fuel burn. In addition, work was carried out to establish similar goals for the reduction of fuel burn through operational measures (e.g. improvement of air traffic management). In order to ensure transparency, it was agreed that the goals would be established and reviewed by panels of Independent Experts (IE).

2.3.2 The independent expert review has been completed for noise reduction technologies and a review to update the NO_x reduction goals has also been carried out. Similarly, a workshop to consolidate the knowledge base for fuel burn improvements through weight reduction, aerodynamic improvement, engine fuel efficiency improvement, and aircraft system optimization has been conducted. The preliminary results of these reviews and workshop will be presented to the next CAEP SG meeting and will be finalized for the CAEP/8 meeting.

2.3.3 An IE panel tasked with estimating the environmental improvements expected from ATM and other operational initiatives in the mid-term and long-term has met twice and will be presenting its final report during the CAEP/8 meeting. The IE panel activities were coordinated with the ICAO ATM Section and the IFPP (Instrument Flight Procedures Panel).

2.4 ICAO Environmental Goals Assessment

2.4.1 A robust modelling framework to assess progress against the ICAO environmental goals was established to respond to the request of the last ICAO Assembly. Various models have been evaluated and found to be suitable for the CAEP process. To ensure that these models work from common inputs, a significant effort has been made to update and reach consensus on global databases such as those for airports, aircraft movements and fleet.

2.4.2 CAEP has generated initial projections of NO_x and CO₂ emissions; and estimates of population exposed to aircraft noise for the years 2016, 2026, and 2036 relative to a 2006 baseline that incorporates the expected technological and operational improvements resulting from the IE review process. In response to the GIACC/3 request, this analysis was extended to include the years 2012, 2020, 2025, and 2050; and to consider a range of possible demand scenarios.

2.5 Preliminary analysis from the ICAO's Committee on Aviation and Environmental Protection (CAEP) shows that global aviation fuel burn is expected to grow from 190 Mega tonnes (Mt) in 2006 to the range of 280 to 1,430 Mt (likely 730 to 880 Mt) in 2050. Not accounting for the impact of alternative fuels, CO₂ is predicted to grow from 600 Mt in 2006 to the range of 890 to 4,520 Mt (likely 2,300 to 2,800 Mt) in 2050.

2.6 CAEP's work on the list of measures to reduce emissions

2.6.1 The ICAO guidance on *Operational Opportunities to Minimize Fuel Use and Reduce Emissions* (Circular 303), that identifies and reviews various operational opportunities and techniques for minimizing fuel consumption and hence CO₂ emissions, in civil aviation operations, is being updated with new and updated information on current initiatives relating to fuel burn reduction. The new guidance replacing Circular 303 will include, inter alia, guidance on computing, assessing and reporting on aviation emissions, and environmental indicators. It is envisaged that this work will be finalized by February 2010. This work is being developed in coordination with ICAO ANB Sections, the Instrument Flight Procedures Panel (IFPP) and the Operations Panel (OPSP).

2.7 Market-based measures

2.7.1 With regard to market-based measures, ICAO has developed policies and guidance material and has been collecting information on three market-based measures: 1) voluntary measures; 2) emission-related charges; and 3) emissions trading. CAEP is now studying issues related to linking emissions trading schemes including aviation. It is also reviewing the various emissions offset measures to mitigate effects of aviation on climate change.

2.8 Carbon Emissions Calculator

2.8.1 Since June 2008, the ICAO public website has included a Carbon Emissions Calculator, whose impartial, peer reviewed methodology was developed through CAEP. It applies the best publicly available industry data to account for various factors such as aircraft types, route specific data, passenger load factors and cargo carried. In support of the Climate Neutral UN initiative, a special interface to the Calculator was developed by ICAO. The UN Environment Management Group (UNEMG) in April 2009 endorsed ICAO's Calculator as the official tool to compute carbon dioxide (CO₂) emissions from air travel for the UN system.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to:

- a) note the information presented in this paper and note that ICAO will continue to keep the regions informed of future developments on the subject of aviation noise, local air quality, and greenhouse gas emissions; and
- b) continue considering environmental issues in the planning and implementation of regional air navigation systems as well as ground support systems including the development of new routes, design of terminal procedures, and ground movements.