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Agenda Item 8: Environment Matters
8.2 Aircraft Noise and Local Air Quality Considerations

AIRCRAFT NOISE AND LOCAL AIR QUALITY CONSIDERATIONS

(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.

Action by C/CAR/DCA is in paragraph 4.

References:

- Annex 16, Volumes I and II
- Doc 9501, Environmental Technical Manual on the use of Procedures in the Noise Certification of Aircraft

Strategic Objectives	*This working paper is related to Strategic Objectives C1 and C2.*

1. INTRODUCTION

1.1 The aviation environmental issues of today can be broadly categorized as those affecting local environment primarily in the vicinity of airports and those resulting in global climate impacts. Although, at present, climate change issues resulting from aviation greenhouse gas emissions dominate the news, noise and local air quality issues around airports remain the major consideration in the operations of airports and consequently may constrain any expansion or growth in air traffic. This paper focuses on ICAO's work on local environmental issues, viz., noise and local air quality.

1.2 ICAO started its environmental work in the 1960s when the introduction of turbojet aircraft to commercial airline fleets resulted in significantly increased noise exposure for communities around airports. In response to the international community's request for action, ICAO established its Committee on Aircraft Noise (CAN) in 1970. Soon afterwards, the effect of aircraft engine emissions on local air quality in the vicinity of airports was realized. This resulted in ICAO establishing its Committee on Aircraft Engine Emissions (CAEE) in 1977. Keeping in mind the interdependent nature of these environmental concerns, the two committees were combined to form the Committee on Aviation Environmental Protection (CAEP) in 1983 which continues its work till the present day.

1.3 While ICAO is working towards the establishment of global Standards and international harmonization of methodologies, it must be noted that implementation takes place at the regional and local levels. For this reason, it is critical for regional groups to understand the high-level objectives of ICAO and for technical groups, like CAEP, to be informed of developments in the regions to be able to support the assessment of the environmental protection benefits of regional plans.

2. SUMMARY OF CAEP WORK

2.1 The eighth meeting of the Committee on Aviation Environmental Protection (CAEP/8) is planned to be held in Montréal from 1 to 12 February 2010. Extensive preparatory work has been undertaken since the CAEP/7 meeting in February 2007. In preparation for this meeting, CAEP has held three Steering Group meetings, the last one being from 22 to 26 June 2009. In addition to the Steering Group meetings, more than twenty meetings at the working group/task force level, and numerous teleconferences have been held. All of the studies carried out will be extensively documented for presentation at the CAEP/8 meeting in February 2010.

2.2 Noise Curfews

2.2.1 The ICAO Council has asked CAEP to study the environmental impact that one region's airport curfews has on other regions. An analysis is underway that is focused on the issue of night-time noise with case studies for city pairs between Europe and South Africa and India. The work completed to-date indicates possible links between airport curfews in Europe and night-time movements in India, while acknowledging other influencing forces such as time zone, airline economics and passenger demand. A report is expected to be completed on this topic for the CAEP/8 meeting in February 2010. Based on the preliminary results of this analysis, remedies for the affected airports could be pursued through cooperation by those States.

2.3 Proposals for amendments to Annex 16 and supporting studies

2.3.1 The CAEP WG3 (emissions technical working group) has done considerable analysis of several NOx stringency policy options. A decision on a new NOx Standard for new aircraft engines is expected to be reached during the CAEP/8 meeting. This will result in an amendment to Annex 16 – *Environmental Protection*, Volume II – *Aircraft Engine Emissions*.

2.3.2 Policy options for production cut-off based on NOx emissions have also been examined. It is expected that CAEP/8 will adopt a production cut-off associated with the CAEP/6 NOx standard at the earliest practical effective date with some exemption guidelines. With regard to future gaseous emissions Standards production cut-offs, the necessary assessments can be conducted once such Standards have entered into force noting that such assessments are dependent on factors such as the effect of market responses on the production of non-compliant engines and practical experience with the exemption process.

2.3.3 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. With this new material, the structure of the ETM will parallel that of the Annex 16, i.e., the new Doc 9501 – *Environmental Technical Manual on the Use of Procedures in the Certification of Aircraft and Aircraft Engines* will be comprised of two volumes on noise and emissions, respectively.

2.3.4 Specialist technical working groups are also addressing two important areas of interest related to Particulate Matter (PM) emissions, viz., the latest understanding of aviation PM impacts on both ambient air quality and climate change, and the assessment of the availability of necessary data elements required for environmental impact studies of aircraft particle emissions on surface air quality and climate change.

2.3.5 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, the working group on noise technical issues is expected to be requested at CAEP/8 to study new noise stringency options for possible adoption at CAEP/9.

2.3.6 Several aspects related to the applicability language regarding noise certification of aircraft have been addressed to ensure a consistent process in all States. Such proposals to clarify the text in Annex 16 – *Environmental Protection* and Volume I – *Aircraft Noise*, are expected to be finalized at CAEP/8.

2.3.7 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. The dual purposes of the new ETM are first to promote uniformity of implementation of the technical procedures of Annex 16 , Volume I, and secondly, to provide guidance to certificating authorities and applicants regarding the intended meaning of the current Annex and those specific procedures that are deemed acceptable in demonstrating compliance to these Standards. The structure of the resulting document should be adaptable to future amendments of Volume I of the Annex. The revised document is expected to be approved at CAEP/8 and published soon afterwards.

2.4 Goals for Environmental Improvement from Technology and Operational Initiatives

2.4.1 Under the CAEP process, substantial work has been undertaken to establish medium-term (10 years) and long-term (20 years) environmental goals relating to three types of technologies, viz., noise, NOx, and fuel burn. In order to ensure transparency, it was agreed that the goals would be established and reviewed by panels of Independent Experts (IE).

2.4.2 The independent expert review has been completed for noise reduction technologies and a review to update the NOx reduction goals has also been carried out. The preliminary results of these reviews and workshop were presented to the CAEP Steering Group meeting in June 2009 and will be finalized for the CAEP/8 meeting.

2.5 ICAO Environmental Goals Assessment

2.5.1 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.

2.5.2 CAEP has generated initial projections of emissions of concern for local air quality (NOx, PM, etc.) 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.

2.5.3 NOx results below and above 3,000 ft have been computed across four scenarios: “do nothing”, “CAEP/7 baseline”, “moderate aircraft technology and operational improvement”, and “advanced aircraft technology and operational improvement”, noting that the “do nothing” and “CAEP/7 baseline” scenarios are considered to be unlikely outcomes. NOx emissions below 3,000 ft are projected to increase from a baseline of 0.25 Mt in 2006 to between 0.5 Mt and 0.7 Mt in 2036, depending upon scenario. NOx emissions above 3,000 ft are projected to increase from a baseline of 2.5 Mt in 2006 to between 4.8 Mt and 6.2 Mt in 2036, depending upon scenario.

2.5.4 PM results below 3,000 ft have been computed across three scenarios: “do nothing”, “CAEP/7 baseline”, and “moderate operational improvements”. Based on the likely “moderate operational improvements” scenario, PM emissions are expected to grow from 2,200 tonnes in 2006 to 6,000 tonnes in 2036.

2.5.5 Noise results in terms of population exposed to noise above 55 DNL have been computed across 4 scenarios: “CAEP/7 baseline”, “low aircraft technology and moderate operational improvement”, “moderate aircraft technology and operational improvement”, and “advanced aircraft technology and moderate operational improvement”. The same trends are observed in other noise contours (i.e. 65 DNL). In 2036, the analysis shows that the population exposed to noise above 55 DNL will increase between 28 and 65 per cent for the three more likely scenarios. However, it should be noted that the noise results vary substantially by region due to the different composition and age of the fleets in each region.

2.6 Market-based measures

2.6.1 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.

3. CURRENT STATUS

3.1 CAEP has carried out substantial work since its last meeting (CAEP/7) and its working groups will finalize their work during meetings planned for later this year based on Steering Group recommendations. Their final results and studies will be presented to CAEP/8. The Secretariat will keep the regional groups informed of the progress on measures to reduce aviation’s impact on noise and local air quality since it is critical for regional groups to understand the high-level objectives of ICAO and for technical groups, like CAEP, to be informed of developments in the regions to be able to support the assessment of the environmental protection benefits of regional plans.

4. SUGGESTED ACTION

4.1 The Meeting is invited to:

a) note the information presented in this paper;

b) recognize the possible effect of one region's airport curfews on other regions and to coordinate with potentially affected States on the issue of curfews;

c) continue considering environmental issues in the planning and implementation of regional air navigation systems including the development of new routes, design of terminal procedures, and ground movements; and

d) note that CAEP will continue to keep the regions informed of future developments on the subject of aviation noise and local air quality.

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