



GROUP ON INTERNATIONAL AVIATION AND CLIMATE CHANGE (GIACC)

FOURTH MEETING

Montréal, 25 to 27 May 2009

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

CAEP RESPONSES TO REQUESTS FROM GIACC/3

(Presented by the Secretariat)

1. INTRODUCTION

1.1 This paper provides a progress report on the tasks requested from the third meeting of Group on International Aviation and Climate Change (GIACC/3) to the Committee on Aviation Environmental Protection (CAEP) including:

- CAEP's initial view on exploring a fuel efficiency metric that takes into account alternative fuels;
- CAEP's initial view on considering fuel conversion factors for alternative fuels;
- CAEP's initial view on considering the development of an aviation CO₂ Standard;
- report on possible average weight for passengers; and
- report on the status of developing new guidance replacing Circular 303 and of studies on market-based measures.

2. FUEL EFFICIENCY METRIC THAT TAKES INTO ACCOUNT ALTERNATIVE FUELS

2.1 As reported to the GIACC/3 meeting, the last CAEP Steering Group (SG) meeting in September 2008 endorsed the use of the "Commercial Aircraft System Fuel Efficiency Metric (CASFE = Fuel Mass Consumed / Payload × Distance)" as the fuel-efficiency metric for environmental trends/goals assessment through the CAEP modelling activities.

2.2 Following the request from GIACC/3 to CAEP on exploring the fuel efficiency metric that takes into account the life-cycle environmental benefits of alternative fuels, the CAEP WG3 (Emissions Technical Working Group) meeting in April 2009 discussed this issue and provided the following initial view:

For kerosene-like “drop-in” fuels, the development of any fuel efficiency metric to include emissions from the life cycle of alternative fuels should be approached essentially as a two-part problem. These parts are an efficiency metric (based on fuel properties/aircraft technology/operational parameters), and a separate analysis taking account of life cycle emissions. CAEP has completed some preliminary work on a Commercial Aircraft System Fuel Efficiency Metric (CASFE).

Use of non-kerosene-like fuels (e.g. liquid methane and hydrogen) would seriously impact aircraft design and affect fleet mixes; the current CAEP work has not addressed this matter. (Potential CAEP/9 Work Item)

2.3 In addition, during the last CAEP SG meeting, the US CAEP member presented an information paper that contained a proposal on fuel efficiency metric which would enable a comparison of alternative fuels to the kerosene-like fuels. The CAEP SG meeting agreed to take this idea into account for refinement of the fuel efficiency in the future.

3. FUEL CONVERSION FACTORS FOR ALTERNATIVE FUELS

3.1 Following the request from GIACC/3 to CAEP on considering fuel conversion factors between existing fuels and potential alternative fuels, the CAEP WG3 meeting in April 2009 discussed this issue and provided the following initial view:

Assuming this is purely an issue of the differences in the total life cycle emissions of different fuels, then this is substantially independent of the final user, i.e. it is not an aviation specific issue. A consistent methodology needs to be used for all energy uses and is best addressed from the energy supply side. Aviation needs reliable values for fuels that it might use, but does not need to be the developer of the information. We believe that these issues are being addressed by sources outside of CAEP such as US CAAFI (Commercial Aviation Alternative Fuels Initiative) and European SWAFEA (Sustainable Way for Alternative Fuel and Energy in Aviation).

Alternatively, if this question deals with CO₂ emissions factors then this simply requires knowledge of the fuel composition that would need to be provided by the fuel supplier.

3.2 The initial view will be provided to the next CAEP SG meeting in June 2009, with the result of deliberation in GIACC/4 meeting, for further consideration in CAEP process.

3.3 In this connection, the 28th session of the Intergovernmental Panel on Climate Change (IPCC) in April 2008 approved the development of a “Special Report on Renewable Energy Sources and Climate Change Mitigation”, in which one of the elements is the methodologies of life cycle assessment. The report is to be delivered in the second half of 2010, and CAEP and Secretariat will continue to interact with activities of IPCC in this regard.

4. DEVELOPMENT OF AN AVIATION CO₂ STANDARD

4.1 Upon the request from GIACC/3 to CAEP to provide its initial view on considering the development of aviation CO₂ Standard, the CAEP WG3 meeting, in April 2009, intensively discussed this issue and provided the following initial view:

CAEP has already devoted significant resources in attempting to develop aircraft efficiency parameters and continues work in related areas. Recognizing the importance of this matter, some major considerations to address the question of setting a CO₂ Standard are the following:

- *The development of appropriate metric(s) is a key issue that must be addressed as a first step;*
- *Any Standard should apply to aircraft, not just engines alone;*
- *It may be easier to develop and implement an accurate methodology if it is based upon and solely applicable to new aircraft;*
- *It is essential to avoid metrics and methodology that may contribute to perverse incentives and counterproductive influences on aircraft/engine development. Also there is a need to take into account operational considerations in order to avoid unintended consequences;*
- *The implications for implementation by certification authorities and manufacturers; and*
- *Defining the scope of work could be performed by WG3 to inform CAEP/8 discussion on this issue. (Potential CAEP/9 Work Item)*

4.2 The initial view will be provided to the next CAEP SG meeting in June 2009, with the result of deliberation in GIACC/4 meeting, for further consideration in CAEP process.

5. AVERAGE WEIGHT FOR PASSENGERS

5.1 In order to calculate tonne-kilometres performed with respect to passengers carried and the passenger component of capacity offered in tonne-kilometres available, the issue of the average passenger mass is an important factor. While air carriers are encouraged to make use of mass values per passenger (including checked baggage) that are appropriate for their route structure, ICAO and both the International Air Transport Association (IATA) and the regional air carrier associations recommend that, if that mass is not known, for statistical purposes, air carriers can apply an average passenger mass value, including checked baggage, of 90 kilograms (198 pounds).

5.2 The average mass of 90 kg was established over 70 years ago and the 14th meeting of the ICAO Statistics Panel, held in March 2009, looked into the question as to whether such a value is still pertinent today given the changes in the load carrying capacity of aircraft, in the mass profiles of individuals, and in the amount (kg) of checked baggage which passengers are allowed to carry. Also, a question was raised as to whether a single average passenger mass fits all routes or whether some distinction should be made by differentiating between domestic and international services, or other factors as they become relevant.

5.3 During the discussion at the Panel meeting, although it was not possible to reach a consensus on the value of the average passenger mass, there was some support to raise it to 100 kg, as per the standard in the US. However, there should be caution in making the change without proper justification. Accordingly, the Panel agreed that IATA, with the support of ICAO, should inquire from its

member airlines if an amendment of the average value for the passenger mass from 90 kg to 100 kg would be advisable. As a follow-up to that conclusion, IATA has been requested to conduct a survey seeking from its member airlines their views on the change of the passenger mass. The results of the survey are expected to be presented to the Statistics Division meeting, scheduled for November 2009, for a final decision.

5.4 The environmental goals assessment being conducted by the CAEP modelling activities assumes 91 kg for a passenger's mass and baggage based on a review of historical load factor data collected by the ICAO (CAEP8_MODTF_6_WP05). The CAEP Aviation Carbon Estimation Task Force determined that for the purposes of the Carbon Calculator it is appropriate to assume 100 kg for a passenger's mass and baggage (CAEP ACE Report, April 2008). A potential CAEP/9 work item is to revisit this weight assumption for environmental analysis purposes.

6. ACTIVITIES OF CAEP ON EMISSIONS REDUCTION MEASURES

6.1 New Guidance replacing Circular 303

6.1.1 In 2004, ICAO published *Operational Opportunities to Minimize Fuel Use and Reduce Emissions* (Circular 303). This guidance identifies and reviews various operational opportunities and techniques for minimizing fuel consumption and hence CO₂ emissions, in civil aviation operations. Operations covered in the guidance are: ground-level and in-flight aircraft operations, ground service equipment (GSE) and auxiliary power units (APUs), with potential actions to facilitate their broader application. This material was the basis for Secretariat to provide inputs for the work of GIACC on the development of the list of measures to reduce aviation emissions.

6.1.2 CAEP is now preparing new guidance that will replace Circular 303 with new and updated information on current initiatives relating to fuel burn reduction. The last CAEP SG meeting agreed that the new guidance will provide an update on current initiatives and, to the extent possible, include provisions covering 1) environmental impact assessment methodology, 2) guidance on computing, assessing and reporting on aviation emissions, and 3) environmental indicators. The draft guidance will be ready in time for the next CAEP SG meeting in June 2009.

6.2 Studies on Market-based Measures

6.2.1 One of the market-based measures being studied by CAEP is carbon offsetting. It involves calculating the emissions by air-travel then compensating for the produced emissions with an equivalent amount of emissions savings from emissions-reduction projects. The correct estimation of emissions from air-travel is essential to quantify the amount of CO₂ emissions to be offset. With a view to provide appropriate information on CO₂ emissions from air-travel, ICAO/CAEP developed Carbon Emissions Calculator in June 2008 which is available on the website (<http://www.icao.int/>).

6.2.2 CAEP is now conducting a scoping study on potential for emissions offset measures to mitigate impact of aviation on climate change. The draft report of this study will be ready in time for the next CAEP SG meeting in June 2009. The study identifies this offset measure as having a potential for being implementable in a short term due to its easy and practical implementation features. There is already an internationally accepted tool for the estimate of emissions per passenger (ICAO Calculator) that could facilitate the development of a global offsetting scheme for aviation.

6.2.3 Another CAEP activity on market-based measures to reduce aviation CO₂ emissions is a scoping study on issues related to linking open emissions trading systems including aviation. The draft

report of this study will be ready in time of next CAEP SG meeting in June 2009. With the implementation of different emissions trading schemes throughout the world, harmonization of features and processes to the extent possible, will highly facilitate the linkage of such schemes enabling the creation of a global scheme.

7. **WORK ON AVIATION AND ALTERNATIVE FUELS**

7.1 Developments in ICAO in the area of aviation and alternative fuels are contained in GIACC/4-IP/3.

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