International Civil Aviation Organization

FIFTEENTH MEETING OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG/15)
Bangkok, Thailand, 23 to 27 August 2004

Agenda Item 3: CNS/ATM Implementation and Related Activities

ASSESSMENT OF ENVIRONMENTAL BENEFITS OF CNS/ATM SYSTEMS — NEED FOR GUIDELINES AT THE NATIONAL LEVEL

(Presented by the Secretariat)

SUMMARY

This working paper updates the meeting on recent developments in ICAO in the field of environmental protection and discusses the need for guidelines for the development of a tool for assessing the environmental benefits of CNS/ATM systems at the national level.

Action by the APANPIRG is at paragraph 5.

REFERENCES

Doc 9750, *Global Air Navigation Plan for CNS/ATM Systems*
Circ 303, *Operational Opportunities to Minimize Fuel Use and Reduce Emissions*

Draft guidance material for the development of business case for the implementation of CNS/ATM systems

1. INTRODUCTION

1.1 Since the Fourth ALLPIRG Meeting in February 2001, when the importance of considering the environmental issues while defining CNS/ATM implementation strategies was recognized, ICAO has taken the necessary steps to address the potential environmental benefits which accrue from the CNS/ATM systems implementation. Among the most relevant measures taken to date are: the inclusion of environmental considerations in the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750-AN/963), the continuing development of global and regional models to calculate the emissions which accrue from the implementation of CNS/ATM systems; and the development of ICAO Circular 303, *Operational Opportunities to Minimize Fuel Use and Reduce Emissions*, together with the organization of two workshops, which were held based on information from the Circular.

1.2 The Sixth meeting of the Committee on Aviation Environmental Protection (CAEP/6) held at ICAO Headquarters in Montreal, Canada, from 2 to 12 February 2004 adopted a series of recommendations on aircraft engine emissions which have since been considered by the Council of ICAO. They reflect the three principal approaches that ICAO is pursuing to limit or reduce emissions, namely taking action at source, reducing fuel burn through market-based measures, and by operational measures, the later encompassing measures related with the implementation of CNS/ATM systems.

1.3 Although considerable effort has been placed to estimate the aviation's emissions impact and sophisticated emissions models are currently being developed to estimate the benefits which accrue from the different emissions reduction measures, the main focus of such efforts is on the global and regional context and the tools under consideration are not expected to provide in the short term the degree of flexibility and practicability requested to perform such estimates at the State level.

2. MODELLING THE AVIATION EMISSIONS

2.1 The first model to address environmental benefits of CNS/ATM Systems implementation was the parametric model developed by CAEP as an initial methodology to assess the environmental benefits of proposed CNS/ATM enhancements, to provide an initial global assessment of those benefits. This study was a cooperative effort between EUROCONTROL (the European Organization of the Safety of Air Navigation) and the FAA (the U.S. Federal Aviation Administration) under the sponsorship of CAEP.

2.2 The results of this study also helped support ICAO's activities in response to the request enshrined in the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC). Besides technology and market-based options, operational measures and other enhanced air traffic procedures can help reduce aviation fuel burn, and thereby reduce the levels of aviation emissions.

2.3 In 1998, the FAA performed an analysis of the emissions due to aircraft in the contiguous United States (The Impact of National Airspace System (NAS) on Aircraft Emissions, September 1998). CAEP expanded this 1998 study into a parametric model capable of estimating global emissions and fuel usage and evaluating the impacts of various CNS/ATM enhancements. EUROCONTROL supplied the inputs necessary to evaluate the European airspace as well as assist with the evaluation of the model. In parallel with the FAA developing the parametric model, EUROCONTROL developed a simulation of the ECAC airspace. These two efforts complimented each other and provided a more robust analysis.

2.4 The results demonstrated overall fuel savings, and associated reductions of CO_2, on the order of 5per cent in both the U.S. and European regions.

2.5 At CAEP/5 (2001) it was proposed expanding the study to other regions, including assessments of the environmental benefits of individual regional CNS/ATM implementation plans, by collecting, as much as possible, the necessary regional data to expand the model.

2.6 However, no additional funding was identified to support further regional analysis of CNS/ATM benefits using the parametric model as had been used for the initial study of North America and Europe. The necessary funding was estimated at $200,000 to $300,000. However, the members were informed of the development of new modelling efforts — specifically AERO2K in Europe and SAGE

(System for assessing Aviation's Global Emissions) by the United States — that had the potential to do these regional studies.

2.7 In light of the development of these new modelling capabilities, and the fact that no funding has been forthcoming to support a full parametric assessment, CAEP would focus its efforts in the near-term on data collection, and in the longer-term would further assess modelling capabilities with the potential to complete the CNS/ATM studies. With this in mind, an ICAO State letter (AN 1/17-03/86) was sent to member States requesting that they nominate a focal point for data collection. The goal was to collect regional data that could be used by any of the models being developed for future emissions modelling work and to avoid repetition of data requests in the future.

2.8 The success of this effort would depend on the response of the regional and State authorities, and the nature of the data that could be obtained. Again, due to the inability to proceed with the parametric model, and the difficulty in obtaining regional data plus the uncertainty of the results of that data once CAEP is able to get it, CAEP has not been able to deliver the regional analyses for CAEP/6 (2004). Information was provided on the status of SAGE and AERO2K and their capabilities.

2.9 The CAEP/6 recognized the potential for SAGE and possibly AERO2K to do the expanded environmental benefits modelling of the regional CNS/ATM implementation plans. CAEP is currently analysing these models and the environmental-related information contained in Doc 9750 will be updated accordingly.

3. OTHER DEVELOPMENTS

3.1 Since CAEP/5, CAEP conducted two regional workshops on operational opportunities to minimize fuel use and reduce emissions, encompassing some of the operational opportunities which accrue from the CNS and ATM initiatives. The first was in Madrid, Spain in May 2002, and the second was in Ottawa, Canada in November 2002. Each workshop had close to 130 attendees representing all aspects of aviation. The documentation from the workshops can be accessed at the ICAO website (http://www.icao.int/icao/en/m_meetings.html) under the specific meetings site.

3.2 The objective of the workshops was to disseminate information contained in Circular 303, and to encourage the use of voluntary operational measures and practices that can achieve near-term reductions in aircraft emissions. The workshops have panels on aircraft, air traffic management, airline planning, flight operations, and airports — both air side and ground side operations — aligned with the various chapters in the circular. Chapter 6 is entirely dedicated to measures related to Air Traffic Management. These workshops were both very successful and they have generated interest for additional workshops.

3.3 ICAO continued to report to the UNFCCC process and has recently presented a Statement and organised a side event to the Twentieth meeting of the Subsidiary Body for Scientific and Technological Advice (SBSTA/20) on the status of the aviation emissions models (SAGE, AERO2k and AERO). The presentations can be accessed at (http://unfccc.int/sessions/sb20/index.html) under " side events and exhibits" from 17 June 2004.

3.4 ICAO is also assisting the Intergovernmental Panel on Climate Change Technical Support Unit in the latest revision of the IPCC guidelines for national greenhouse gas inventories. The request relates to emissions factors and other parameters relevant to aircraft emissions. Results of the

work on updating the emissions factors are expected to be provided to the IPCC Energy Authors meeting in September 2004.

3.5 In line with the CAEP/6 recommendation, CAEP has started its activities under the new work programme and regarding emissions reduction by operational means CAEP endeavours to: continue to conduct workshops on *Aviation Operational Measures for Fuel and Emissions Reductions* in the remaining ICAO regions; continue to collect necessary operational data to support the assessment of the environmental benefits of CNS/ATM in all of ICAO's regions utilizing available modelling tools; assess the current and future capabilities of SAGE and AERO2K to model the environmental benefits of regional CNS/ATM implementation plans and their possible application to the work of CAEP; review and update ICAO's Global Air Navigation Plan to reflect, as appropriate, a revised approach to modelling and assessing the environmental benefits of regional CNS/ATM implementation plans; and build upon the draft ICAO Circular on *Operational Opportunities to Minimize Fuel Use and Reduce Emissions* with a view to expand the use of the most effective practices industry wide and to explore their use as a basis for future voluntary agreements.

4. NEED FOR A NATIONAL MODEL

4.1 Although the different elements of CNS/ATM systems could be implemented using global, regional, subregional or national approaches, it must be acknowledged that, ultimately, it is the State which actually invests in the infrastructure and as such needs to know what the costs and benefits are. Recognizing such a need (Resolution A32-12: Follow-up to the 1998 Worldwide CNS/ATM Systems Implementation Conference refers) for the formulation of a business case so as to secure financing of the implementation of CNS/ATM systems, ICAO has just completed developing the relevant business case guidance material that includes financial analysis and risk management by means of a user friendly software. While quantifying the operational, technical and economic benefits, this business case analysis only qualifies the environmental benefits. In order to assist States in the formulation of their business case for the implementation of CNS/ATM systems that also includes environmental benefits, a national model and associated guidance material is considered essential. Such a national model and resultant estimated benefits would further reinforce the approach of the States for the transition to CNS/ATM systems.

4.2 Whilst recognizing that ICAO work on environmental issues requires assessment of the impact of aviation emissions on the global and regional level and that a substantial work has been undergoing in CAEP regarding the development of the appropriate tools to undertake this task, and also recognizing that some of the tools under consideration have the capability of assessing the environmental benefits which accrue from the implementation of the CNS/ATM systems, it is nevertheless necessary to acknowledge that the level of maturity and complexity of such tools, and their proprietary nature would not allow States to use them in their business plan considerations in the short term. To respond to specific needs at the State level, a more practical tool would be necessary.

4.3 Recognizing that to develop such tool, guidance is required from the region through CNS/ATM experts and from experts on the environmental field available in CAEP, this meeting may wish to consider establishing a task force which would coordinate with CAEP through correspondence. This regional group of experts would support CAEP in developing a simplified tool and associated guidance for estimating environmental benefits of CNS/ATM systems at the national level for inclusion on their business case analysis.

5. ACTION BY APANPIRG

5.1 APANPIRG is invited to:

a) note the information contained in this working paper;

b) note the ongoing activities within ICAO/CAEP and the information available on environmental benefits which accrue from the implementation of CNS/ATM systems at the global and regional level.

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