

FOURTH MEETING OF THE ALLPIRG/ADVISORY GROUP**(Montreal, 6 – 8 February 2001)****Agenda Item 2.2: Environmental benefits of CNS/ATM systems****ENVIRONMENTAL BENEFITS ASSOCIATED WITH CNS/ATM INITIATIVES****(Presented by the Secretariat)****SUMMARY**

This paper discusses the importance of environmental issues while defining the CNS/ATM systems implementation strategies. The paper further reports on the results and recommendations from the CAEP/5 Meeting related to the environmental benefits of CNS/ATM systems implementation.

Action by ALLPIRG is proposed at paragraph 4.

1. INTRODUCTION

1.1 The third meeting of the ALLPIRG/Advisory Group (ALLPIRG/3, Montreal, 6 to 8 April 1999) was presented with a working paper on the need to adopt a uniform methodology for the assessment of environmental benefits associated with the implementation of CNS/ATM systems. The meeting, in endorsing Conclusion 3/14 — Cooperation with ICAO/CAEP work, invited ICAO to take the necessary follow-up action.

2. ACTION TAKEN BY THE AIR NAVIGATION COMMISSION AND COUNCIL

2.1 On 11 June 1999, in approving the report of the third meeting of the ALLPIRG/Advisory Group, the Council called upon CAEP to expedite its work on the development of a preliminary methodology for the assessment of the environmental benefits associated with the implementation of CNS/ATM systems. This preliminary methodology was intended to be applied by PIRGs at the earliest opportunity in the analysis

of the business cases, until the final methodology could be incorporated as part of a new chapter into Volume I of the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750).

3. BENEFIT ASSESSMENT METHODOLOGY

3.1 CAEP has since been working on the development of a common methodology for the assessment of the environmental benefits of CNS/ATM systems implementation. In order to keep the PIRGS informed on the development of the work on the methodology, the Secretariat has periodically reported on the status of CAEP's work. The methodology was initially based on a Federal Aviation Administration study that was done for ICAO's Global CNS/ATM Systems Implementation Conference, held in 1998, that evaluated the potential of CNS/ATM procedural enhancements to reduce environmental emissions by reducing fuel burn.

3.2 As the need to encompass the environmental aspects during the consideration of the regional business cases was more immediate, initially, steps were being taken to adopt a preliminary methodology while awaiting the final methodology. However, due to the need to properly reflect regional CNS/ATM systems implementation specificities in a global way, and ensure the necessary compatibility of the methodology, more detailed analysis was found necessary.

3.3 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). The Working Group 4 effort expanded this 1998 study into a parametric model capable of estimating global emissions and fuel usage and evaluating the impacts of various CNS/ATM systems 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.

3.4 The results as shown in the executive summary, and described in detail in the full report, demonstrate overall fuel savings, and associated reductions of CO₂ on the order of 5% in both the US and the European Region.

3.5 The results of the "Methodology for the Quantification of CNS/ATM Environmental Benefits" were recently approved at the fifth meeting of the CAEP (CAEP/5, Montreal, 8 to 17 January 2001). The meeting developed the following recommendation:

**Recommendation 1/1 — Information on the environmental advantages of
CNS/ATM systems implementation**

That ICAO present the results of CAEP's work in this area to the forthcoming ALLPIRG/4 Meeting, and include them as appropriate in the *Global Air Navigation plan for CNS/ATM Systems* (Doc 9750), following a review by the Secretariat.

3.6 The initial assessment of the benefits of CNS/ATM systems focuses on the United States and Europe. The working group proposes expanding the study to include assessments of the environmental benefits of individual regional CNS/ATM systems implementation plans by collecting, as much as possible, the necessary regional data to expand the model. It is envisioned that this would involve working with the

regional planning groups to assess the availability of certain data and would be contingent on identifying the necessary resources to continue the modelling effort.

3.7 The executive summary of the report is included in the appendix.

4. **ACTION BY ALLPIRG**

4.1 The meeting is invited to:

- a) note the importance of considering the environmental issues when defining CNS/ATM systems implementation strategies;
- b) note the importance of establishing a common methodology to assess the environmental benefits of CNS/ATM systems implementation, as a means of avoiding a proliferation of different methodologies;
- c) note the results of the methodology;
- d) note that there are ongoing efforts within CAEP's work programme towards expanding the study to other ICAO Regions; and
- e) endorse this initiative and help provide the necessary support.

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APPENDIX

ENVIRONMENTAL BENEFITS ASSOCIATED WITH CNS/ATM INITIATIVES

MODEL FOR ASSESSING GLOBAL AVIATION EMISSIONS AND POTENTIAL REDUCTION FROM CNS/ATM MEASURES

INTRODUCTION

This report for the Committee on Aviation Environmental Protection (CAEP) of the International Civil Aviation Organization (ICAO), describes the work carried out by EUROCONTROL (the European Organization of the Safety of Air Navigation) and the FAA (the U.S. Federal Aviation Administration) to quantify the impact of CNS/ATM systems on aviation global emissions.

This work is driven in part, by the IPCC Special Report on Aviation and Global Atmosphere (1999), which concluded: “As the aviation industry grows more and more rapidly, the impact of air traffic operations on the global atmosphere becomes increasingly important. Efforts to control or reduce the environmental impact of air traffic have identified a range of options that might reduce the impact of aviation emissions. In particular, it is expected that improvements in air traffic management (ATM) and other enhanced operational procedures for air traffic systems could help reduce aviation fuel burn, and thereby reduce the levels of aviation emissions.”

Working Group 4 (CAEP-WG4) is investigating the environmental benefits associated with planned CNS/ATM initiatives.

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). This analysis focused on the impacts due to changes in CNS/ATM as defined in the National Airspace (NAS) Architecture 3.0. This report showed that the proposed enhancements to the U.S. Air Traffic Control (ATC) system would generate benefits in the form of improved fuel efficiency to operators and reduced pollution to society at large.

This project expanded the 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 provide a cross-check of the results and a means of detecting errors and interpreting discrepancies.

In contrast with some previous studies in this domain, potential benefits from CNS/ATM were assessed based on published implementation strategies. In the case of the United States, NAS version 4 was used (reflecting updates since the original 1998 study), and for Europe (ECAC), the EUROCONTROL ATM 2000+ strategy document was referred to, to identify what could be considered achievable by 2015.

RESULTS

Within the time frame under consideration (1999 – 2015), global air traffic is expected to increase by around 61% (source: FESG). In the same time period, fuel consumption and CO₂ emissions are projected to increase by just 37%.

Fuel burn and CO₂ emissions are growing less quickly than traffic because of the introduction of more efficient engine technology, due to aircraft retirement and fleet expansion.

This reflects the already strong commitment of the aviation industry for fuel conservation and the consequent emission reductions.

The preliminary results of this study show that by 2015, there will be an additional benefit of around 5% fuel burn and CO₂ emission savings due to the introduction of CNS/ATM measures within U.S. and Europe.

Table ES-1 shows a summary of the annual fuel and CO₂ savings for 2015 from CNS/ATM improvements for both the United States (CONUS) and Europe (ECAC). The results are displayed by flight segment.

Table ES-1. Percent Annual Fuel & CO₂ Savings by 2015 due to CNS/ATM

<i>Flight segment</i>	<i>CONUS</i>	<i>ECAC</i>
<i>Above 3000'</i>	5 %	4 %
<i>Below 3000'</i>	5 %	7 %
<i>Surface</i>	11 %	3. %
<i>Whole flight</i>	5 %	5 %

Preliminary results show savings of a similar order of magnitude for NO_x, HC and CO, but all the work is subject to further analysis, verification and validation.

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