



*International Civil Aviation Organization*

**Second Meeting of the Air Traffic Management  
Performance Measurement Task Force**

**(APM TF/2)**  
**(Cairo, Egypt, 10 –12 November 2014)**

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**Agenda Item 2: Global and Regional developments related to operational improvements and environmental benefits**

**GLOBAL AND REGIONAL DEVELOPMENTS RELATED TO CO2 EMISSIONS**

*(Presented by the Secretariat)*

**SUMMARY**

This paper presents the Global and Regional developments related to CO2 emissions reduction.

Action by the meeting is at paragraph 3.

**REFERENCES**

- Guidance on the Development of States' Action Plans on CO2 Emissions Reduction Activities (DOC 9988)
- ICAO CAEP Portal (<http://www.icao.int/environmental-protection/Pages/default.aspx>)
- MIDANPIRG/14 Report
- State Letter Ref. AN 1/17 – 14/57 dated 10 September 2014

**1. INTRODUCTION**

1.1 The Committee on Aviation Environmental Protection (CAEP) is a technical committee of the ICAO Council established in 1983. CAEP assists the Council in formulating new policies and adopting new Standards and Recommended Practices (SARPs) related to aircraft noise and emissions, and more generally to aviation environmental impact.

**2. DISCUSSION**

***Action Plans on emissions reduction***

2.1 The meeting may wish to note that the 38th Assembly highlighted the importance of reinforcing the voluntary nature of States' action plans on CO2 emissions reduction. It encouraged Member States to voluntarily submit more complete and robust data in their action plans to facilitate the compilation of global emissions data by ICAO, and to make their action plans publically available. It also encouraged the partnerships among ICAO, States and other organizations to support the preparation of action plans, and emphasized the need for the Secretariat to provide further guidance and other technical assistance.

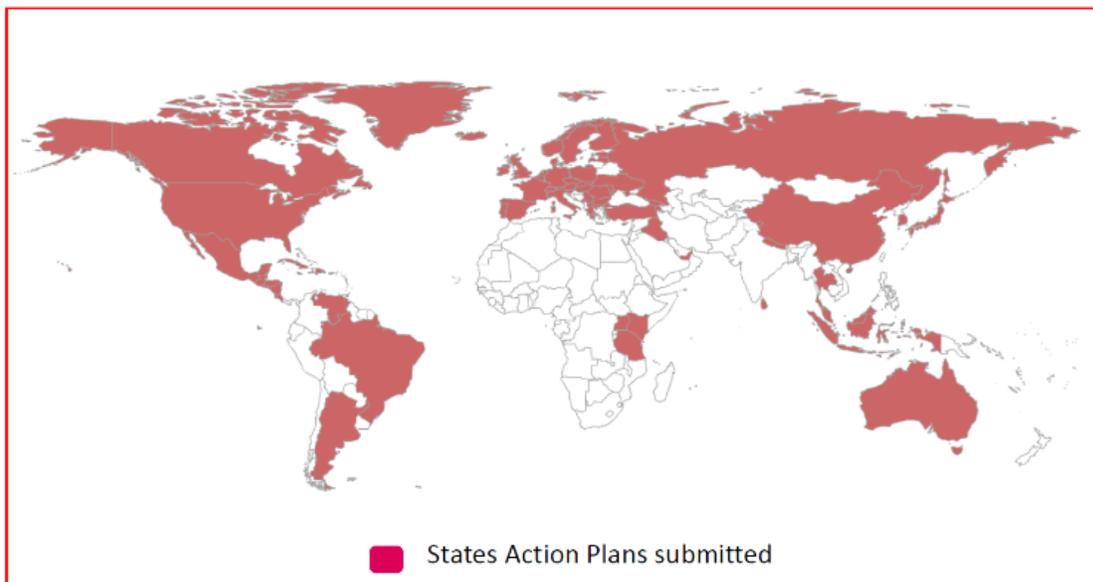
2.2 An action plan is a means for States to communicate to ICAO information on activities to address CO<sub>2</sub> emissions from international aviation. The level of information contained in an action plan should be sufficient to demonstrate the effectiveness of actions and to enable ICAO to measure progress towards meeting the global goals set by Assembly Resolution A38-18. Action plans give States the ability to: establish partnerships; promote cooperation and capacity building; facilitate technology transfer; and provide assistance.

2.3 At a minimum the following information should be contained in the plan:

- Contact information;
- Baseline (without action) fuel consumption and traffic (2010 or earlier to 2050);
- List of measures proposed to address CO<sub>2</sub> emission from international civil aviation;
- Expected results (fuel consumption and traffic with the actions being taken 2014 to 2050); and
- Information on any assistance needs (financial, technological, training, etc.).

*N.B: States are invited to update and submit their action plans once every three years.*

2.4 The meeting may wish to note that, from the MID Region only three (3) States (Iraq, Jordan and UAE) have provided their action plans:



2.5 The meeting may wish to note that, the 38<sup>th</sup> Assembly through the Resolution A38-18, resolved that States and relevant organizations will work through ICAO to achieve a global annual average fuel efficiency improvement of 2 per cent until 2020 and an aspirational global fuel efficiency improvement rate of 2 per cent per annum from 2021 to 2050, calculated on the basis of volume of fuel used per revenue tonne kilometre performed.

### ***CAEP Questionnaires***

2.6 The meeting may wish to note that ICAO issued a State Letter Ref. AN 1/17 – 14/57 dated 10 September 2014 at **Appendix A** to this working paper, requesting States to provide CAEP with information and data related to environmental benefits, by **31 December 2014**.

2.7 The State Letter contains two (2) questionnaires on Noise certification of unmanned aircraft systems and fuel availability and composition of commercial fuel. Moreover, the State Letter includes two (2) requests for information about Radar data and Alternative Fuels.

2.8 The meeting may wish to recall that, MIDANPIRG/14 meeting (Jeddah, Saudi Arabia, 15-19 December 2013), through MIDANPIRG Conclusion 14/29, encouraged States to develop/update their Action Plans for CO2 emissions and submit them to the ICAO MID Regional Office or through the APER website on the ICAO Portal:  
<http://www.icao.int/environmentalprotection/Pages/action-plan.asp>

2.9 The meeting way wish to note that, in order to provide assistance to States in developing/updating their Action Plans for CO2 emissions, a Seminar on International Aviation, Environment and States' Action Plans is planned to be held in Dubai, UAE in **23-25 March 2015**.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to encourage States to:

- a) provide the meeting with an update on the status of their Action Plans for CO2 emissions;
- b) develop/update their Action Plans for CO2 emissions and submit them to the ICAO MID Regional Office or through the APER website on the ICAO Portal;
- c) attend the Seminar on International Aviation, Environment and States' Action Plans (Dubai, UAE, 23-25 March 2015); and
- d) provide ICAO with their data and information requested by the State Letter Ref. AN 1/17 – 14/57 dated 10 September 2014, not later than **31 December 2014**.

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International  
Civil Aviation  
Organization

Organisation  
de l'aviation civile  
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Organización  
de Aviación Civil  
Internacional

Международная  
организация  
гражданской  
авиации

منظمة الطيران  
المدني الدولي

国际民用  
航空组织

Ref.: AN 1/17 – 14/57

10 September 2014

**Subject:** International Civil Aviation Organization  
(ICAO) Committee on Aviation Environmental  
Protection (CAEP) Request for Data and Information

**Action required:** Submit completed questionnaires to  
ICAO by 31 December 2014

Sir/Madam,

Global demand for air travel is estimated to increase significantly in the future. While this growth will deliver global economic and social benefits, its negative impact on the environment from aircraft noise and emissions is to be minimized. In this regard, the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP) is the body responsible for undertaking specific technical analyses related to control of aircraft noise and gaseous emissions from aircraft engines. The work of CAEP is undertaken by Working Groups, each tasked with a specific work programme related to a particular technical area, including aircraft noise, operations, aircraft engine emissions, modelling and data analysis, alternative fuels, and market-based measures.

The Working Groups rely on the cooperation of all ICAO Member States to provide the data and information required to accurately complete the studies and analyses with which they have been tasked. At the request of States, in order to reduce the burden of responding to multiple requests on the same topic, this letter includes a consolidated request for all information and data required by CAEP this year. Each attachment to this letter serves as a stand-alone request for information that can be provided to the appropriate departments within your Government.

I encourage your Government to submit to ICAO the data and information requested herein, no later than 31 December 2014.

Accept, Sir/Madam, the assurances of my highest consideration.

Raymond Benjamin  
Secretary General

**Enclosures:**

- A — Questionnaire on Noise Certification of Unmanned Aircraft Systems (UAS)
- B — Questionnaire on Certification Fuel Availability and Composition of Commercial Fuel
- C — Request for radar information and data
- D — Request for alternative fuels information and data

**CAEP WORKING GROUP 1 – AIRCRAFT NOISE, TECHNICAL**

**QUESTIONNAIRE ON NOISE CERTIFICATION OF UNMANNED AIRCRAFT SYSTEMS (UAS)**

CAEP Working Group 1 - Aircraft Noise Technical (WG1) is tasked with keeping ICAO noise certification Standards (Annex 16 – *Environmental Protection*, Volume I – *Aircraft Noise to the Convention on International Civil Aviation*) up to date and effective, while ensuring that the certification procedures are as simple and inexpensive as possible.

CAEP WG1 has been tasked to review the status of Unmanned Aircraft Systems (UAS) and inform CAEP if there is a need for work on the noise certification of UAS. The first action by WG1 will be to make an inventory of the current status of rules and practices, and any experiences and plans States may have, with respect to UAS noise certification. This is the purpose of this questionnaire.

For the purpose s of this exercise, a UAS is defined as an aircraft and its associated elements which are operated with no pilot on board.

Question	Answer
<p><b>1) Annex 16, Volume I currently has no lower weight limits and is not limited to manned aircraft. Thus some Chapters therein may be applicable to some types of UAS. Does your State currently apply (or would apply if there was an application) the requirements of ICAO Annex 16, Volume I (or equivalent) for noise certification of UAS?</b></p>	
<p>If so, under what regulatory regime were they certified? (e.g. flight operations, design, airspace or airways usage, crew license, etc.)</p>	
<p><b>2) If your State does not apply Annex 16, Volume I, does your State apply any alternative requirements, guidance, procedures or policies for UAS with regard to the general purpose of noise management at the source or noise certification<sup>1</sup>?</b></p>	

<sup>1</sup> The purpose of noise certification is defined here as: "to ensure that the latest available noise reduction technology is incorporated into aircraft design demonstrated by procedures which are relevant to day to day operations, to ensure that noise reduction offered by technology is reflected in reductions around airports".

<p><b>3) If your State did apply noise management at the source or a certification scheme of any kind for UAS, what was your experience? (Please indicate problems, recommendations, lessons learned.)</b></p>	
<p><b>4) Did your State take into account specific operational features or particular uses (e.g. environmental monitoring, firefighting, etc.), how UAS are operated, and/or any operating restrictions applicable when establishing the noise management at source or certification scheme?</b></p>	
<p><b>5) Does your State issue noise certificates for UAS? Is your State interested in issuing noise certificates for UAS?</b></p>	
<p><b>6) Do you consider UAS a noise problem in your State? Please describe your State's experience.</b></p>	
<p>Does your State have any plans to introduce or remove (specific) noise management at source or certification schemes for UAS?</p>	
<p>If your State is considering the introduction of schemes, please share details or the main characteristics of these schemes with ICAO (e.g. applicability, procedures, metric, regulatory limit values).</p>	

<b>7) Do you foresee any problems in the future linked to noise of UAS in your State? Please explain.</b>	
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This questionnaire can be completed online at <https://portal.icao.int/surveys/En/Lists/QuestionnaireWG1/overview.aspx> or sent in hard copy to:

International Civil Aviation Organization (ICAO)  
Air Transport Bureau  
999 University Street  
Montréal, Quebec  
H3C 5H7  
Canada  
E-mail: [env@icao.int](mailto:env@icao.int)  
Fax: +1 514-954-6744

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**CAEP WORKING GROUP 3 – EMISSIONS TECHNICAL**

**QUESTIONNAIRE ON CERTIFICATION FUEL AVAILABILITY AND  
COMPOSITION OF COMMERCIAL FUEL**

CAEP Working Group 3 – Emissions Technical (WG3) is tasked with keeping ICAO emissions certification Standards (Annex 16 – *Environmental Protection*, Volume II – *Aircraft Engine Emissions* to the *Convention on International Civil Aviation*) up to date and effective, while ensuring that the certification procedures are as simple and inexpensive as possible.

CAEP WG3 has been tasked with monitoring trends in aviation kerosene fuel supply composition and assess the consequences for emissions. The purpose of this questionnaire is to collate fuel composition data to help progress this task.

**1. Certification fuel availability**

The fuel specification bodies establish limits on the properties of the fuels for commercial use so that aircraft are safe and environmentally acceptable in operation. For engine emissions certification, the fuel specification is regulated for fuel properties with more stringent limits (Annex 16 – *Environmental Protection*, Volume II – *Aircraft Engine Emissions*, Appendix 4 refers). For example, the certification fuel specifications in Annex 16, Volume II set a minimum 1 per cent volume of naphthalene content and a maximum content of 3 per cent. It has been highlighted by the aerospace manufacturing community that it is challenging to source fuels for certification emission testing that meet this requirement. This raises the wider question on the availability of fuels compliant with the requirements of Annex 16 for fuel emissions testing.

Where information is available, please provide data on the composition of fuels available for emissions testing by completing Table 1. This information could be available from aircraft engine manufacturers or aviation fuel suppliers.

**2. Composition of commercial fuel uplifted**

ICAO continues to monitor trends in aviation kerosene fuel supply composition and assesses the potential consequences on engine emissions. This includes a global survey of fuel sulphur content to support the estimation of global and regional Sulphur Oxide gasses (SOx) emissions.

Where information is available, please provide data on the composition of commercial fuel uplifted for aircraft operations by completing Table 1. This information could be available from aircraft operators or aviation fuel suppliers.

**Table 1: Used to record (1) certification fuel availability and (2) composition of commercial fuel uplifted**

	(1) Certification fuel availability	(2) Composition of commercial fuel uplifted
Volume of Fuel (litres)		
<b><i>Fuel Property</i></b>	<b><i>Property Value</i></b>	<b><i>Property Value</i></b>
Density kg/m <sup>3</sup> at 15°C		
Distillation temperature, °C		
10% boiling point		
Final boiling point		
Net heat of combustion, MJ/kg		
Aromatics, volume %		
Naphthalenes, volume %		
Smoke point, mm		
Hydrogen, mass %		
Sulphur, mass %		
Kinematic viscosity at -20°C, mm <sup>2</sup> /s		

This questionnaire can be completed online at <https://portal.icao.int/surveys/En/Lists/QuestionnaireWG3/overview.aspx> or sent in hard copy to:

International Civil Aviation Organization (ICAO)  
 Air Transport Bureau  
 999 University Street  
 Montréal, Quebec  
 H3C 5H7  
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 E-mail: [env@icao.int](mailto:env@icao.int)  
 Fax: +1 514-954-6744

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**CAEP MODELLING AND DATABASES GROUP (MDG)**

**REQUEST FOR RADAR INFORMATION AND DATA**

ICAO Member States and international organizations make models available to ICAO/CAEP to support its work programme to achieve greenhouse gas (GHG) emissions reductions. Analytical models used to support the ICAO/CAEP modelling needs provide annual fuel burn and emissions inventories, and as well, create future projections of fuel burn and emissions, providing transparency in the data used to inform decisions. The current and future scenarios are then compared against future goals to identify gaps, thus enabling improvements in identifying and prioritizing the mitigation solutions that could be pursued (e.g. technology, operations, alternative fuels, market-based measures as gap fillers, etc.). As aircraft and fuels technology evolves and operational patterns change, the intention is to use this improved knowledge base to refine mitigation solutions to achieve maximum benefit and avoid or minimize negative and unintended consequences.

With regard to the current level of radar data geographic coverage, major gaps exist and additional radar-based operations data is necessary to enhance modelling and analysis efforts within ICAO/CAEP to support the development of a global market-based measure for aviation, as well as other efforts.

The following States/regions provide approximately 75 to 80 per cent global coverage based on 2010 data:

- a) Argentina
- b) Australia – (Pending final agreement)
- c) Brazil
- d) Europe – Source: EUROCONTROL
- e) North and Central America – Source: U.S. Federal Aviation Administration (FAA)

Major gaps in coverage exist in Asia, Africa and the Middle East. Although these regions account for approximately 20 to 25 per cent coverage in 2010, their operational share will increase disproportionately in future years. There are ways of filling these data gaps through the use of commercially available data, but additional radar data would enhance and refine analytical capabilities.

In order to improve modelling and analysis capabilities to better understand the environmental impact of international aviation, including climate impacts, it would be helpful for the radar data to include those regions identified with gaps in raw radar-based operational data. Modelling and analysis efforts to support the development of a proposal for a global market-based measure for aviation, as well as other efforts, can be enhanced with increased radar-based operational data.

**The data requested for FLIGHTS includes:** The unique flight identifier (internal identifier used to link to position data), the departure airport (preferably ICAO code), the arrival airport (preferably ICAO code), the departure time (Coordinated Universal Time (UTC)) and arrival time (UTC), the carrier flight

number (or this and the above combined (e.g. BAW506), tail number/registration, and finally the ICAO service type (S, N, G, M, X) cargo indicator.

**The data requested for POSITIONS includes:** The unique flight identifier (link to flight level data), the sequence number (i.e. flight level position ordering), the position time (UTC), the latitude and longitude position, the altitude (hundreds of feet), and finally the position speed (knots).

In order to facilitate the integration of the data provided, please provide a file or series of files containing the data requested, with the fields in the same order as either a comma separated text file (CSV) or extensible markup language (XML) file. Since the data sets are likely to be large, it is preferable to send the data on DVDs or on a USB hard drive by post to the address below.

Alternatively, instructions for securely uploading the data to ICAO are available at: <https://portal.icao.int/surveys/En/Lists/QuestionnaireMDG/overview.aspx>.

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**CAEP ALTERNATIVE FUELS TASK FORCE (AFTF)**

**REQUEST FOR ALTERNATIVE FUELS INFORMATION AND DATA**

The CAEP Alternative Fuels Task Force (AFTF) is mandated to assess the potential range of emissions reductions from the use of alternative fuels in aviation up to 2050.

The AFTF has developed a methodology to carry out the assessment, which considers a combination of approaches to develop projections for the near, medium and long term. For the short term, the projection will use announcements from industry and States regarding plans and targets for alternative jet fuels production.

States are invited to provide the information listed in the following table.

For the purposes of this questionnaire, alternative jet fuels are defined as all jet fuels that are produced from sources other than petroleum. This includes synthetic fuel made from coal, gas, biomass or waste.

Question	Answer
<b>1) Has your State defined a target for alternative fuel in aviation?</b>	Yes/No
If yes, please provide the targets (million metric tons per year) and corresponding year.	
Is the target defined for production or for use?	
Is the target for commercial aviation or for all types of aviation (including military)?	
In this target, what is the estimated share of the feedstock that could be produced nationally?	
<b>2) Has your State defined a blending mandate for alternative fuel in aviation?</b>	Yes/No
If yes, please provide the mandatory blending ratio (percentage).	
Is the mandate for commercial aviation or for all types of aviation (including military)?	
<b>3) Has your State defined an incentive policy for the use of alternative fuels in aviation?</b>	Yes/No
If yes, what are the incentives for alternative fuel use in aviation?	

<b>4) Has your State initiated a national plan for the development/deployment of alternative fuels in aviation</b> (including initiatives to develop national value chains, feedstock production or processing facilities)?	Yes/No
If yes, please list the initiatives with their purpose (feedstock production/processing facility/entire value chain) and the expected production (thousands metric tons per year of alternative jet fuels).	
What is the range of feedstock considered for deployment?	
What is the range of processes considered for deployment?	
For conversion facilities, what is the share of the feedstock that is to be sourced from domestic resources?	
<b>5) Does your State have a projection related to the national future production of alternative fuels?</b>	Yes/No
If yes, please provide the volume of fuel expected and the corresponding year (thousands metric tons per year of alternative jet fuels).	
What is the range of feedstock considered for deployment?	
What is the range of processes considered for deployment?	
In this projection, what is the estimated share of the feedstock that could be produced nationally?	

This questionnaire can be completed online at <https://portal.icao.int/surveys/En/Lists/QuestionnaireAFTF/overview.aspx> or sent in hard copy to:

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