



**WORKING PAPER**

**ASSEMBLY — 37TH SESSION**

**EXECUTIVE COMMITTEE**

**Agenda Item 17: Environmental protection**

**AVIATION AND ALTERNATIVE FUELS**

(Presented by the Council of ICAO)

**EXECUTIVE SUMMARY**

In response to Assembly Resolution A36-22, Appendix I, encouraging the Council “to promote improved understanding of the potential use, and the related emissions impacts, of alternative aviation fuels,” ICAO hosted a Workshop on Aviation and Alternative Fuels (WAAF) and a Conference on Aviation and Alternative Fuels (CAAF) in February and November 2009, respectively. CAAF approved a Declaration, Recommendations, and the Global Framework for Aviation Alternative Fuels (GFAAF).

It is recognized that even with the anticipated technological and operational improvements, a significant gap will remain with respect to the achievement of environmental sustainability for aviation and alternative fuels could be a key element in addressing this gap.

Drop-in alternative fuels have been proven to be a technically sound solution. Regulatory and financial frameworks are needed to ensure that they are available in sufficient quantities for use in aviation. Though not exclusive to aviation, the definition of sustainability criteria also remains a key issue that will determine the types of feedstocks and processes used to provide alternative fuels in the future.

**Action:** The Assembly is invited to:

- a) acknowledge the organization’s accomplishments in promoting the improved understanding of the potential use and emission effects of alternative fuels as requested in Assembly Resolution A36-22, Appendix I ;
- b) support the continued work of the organization, as summarized in paragraph 5.1 of this paper; and
- c) consider the information in this paper, in particular the recommendations of the Conference on Aviation and Alternative Fuels (CAAF) for the update of Assembly Resolution A36-22.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objective C, <i>Environmental Protection - Minimize the adverse effect of global civil aviation on the environment.</i>
<i>Financial implications:</i>	Additional work in the area of alternative fuels will be accommodated in the Regular Programme budget or through voluntary contributions.
<i>References:</i>	A37-WP/25, <i>Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change</i> <a href="http://www.icao.int/AltFuels">www.icao.int/AltFuels</a> ICAO Environmental Report, Chapter 5

## 1. INTRODUCTION

1.1 Assembly Resolution A36-22 recognized “the importance of research and development in fuel efficiency and alternative fuels for aviation that will enable international air transport operations with a lower environmental impact” and encouraged the Council “to promote improved understanding of the potential use, and the related emissions impacts, of alternative aviation fuels.” In response, two major events were organized by ICAO.

1.2 The Workshop on Aviation and Alternative Fuels (WAAF, 10 to 12 February 2009) served as a preparatory event for the Conference on Aviation and Alternative Fuels (CAAF, 16 to 18 November 2009). The meetings agreed that sustainable alternative aviation fuels could be a win-win solution for reducing aviation’s dependence on fossil fuels and a key element to assist in reducing the impact of aviation on climate change.

1.3 It is now indisputable that drop-in alternative fuels are a technically sound solution that will not require changes to the aircraft or fuel delivery infrastructure. However, the widespread use of these fuels by aviation faces challenges, particularly in the areas of supply and economics. Regulatory and financial frameworks can address these challenges and ensure that aviation is able to benefit from the use of sustainable alternative fuels.

## 2. WHY SUSTAINABLE ALTERNATIVE FUELS FOR AVIATION ARE IMPORTANT

2.1 Engineering improvements, technology enhancements, and advanced operations (including efficiency improvements in air traffic management) all have a role to play in reducing aviation fuel consumption and associated carbon emissions. Significant progress has been made in establishing technology goals for reducing aircraft greenhouse gas (GHG) emissions. On a per-flight basis, efficiency is expected to improve continuously through 2050 and beyond. ICAO is spearheading efforts to promote and harmonize worldwide initiatives for operational practices that result in reducing aviation’s contributions to anthropogenic emissions. However, even under the most aggressive technology forecast scenarios, the anticipated gain in efficiency from technological and operational measures does not offset the overall emissions generated by the expected growth in traffic. The gap between air transport emissions growth reduced by efficiency improvements and a chosen lower level of emissions represents a “mitigation gap” that must be closed using other strategies.

2.2 A promising approach toward closing the GHG emissions mitigation gap is the development and use of sustainable alternative fuels for aviation. Today such fuels are not available in sufficient quantities to meet the overall fuel demand for commercial aviation. Sustainable drop-in alternative fuels produced from biomass or renewable oils offer the potential to reduce life-cycle greenhouse gas emissions and therefore reduce aviation’s contribution to global climate change. They could be an important tool in the efforts to close the mitigation gap while allowing the sector to respond to growing demand. Using these fuels may also offer reduced emissions of particulate matter, lessening aviation’s impact on air quality, as the result of the significantly lower fuel sulphur content.

2.3 Finally, as aviation is heavily dependent over a short and medium-term horizon on drop-in liquid fuels, the development and use of sustainable alternative fuels will play an active role in improving the overall resource allocation and security of supply, and will stabilize fuel prices.

### 3. KEY OUTCOMES OF WAAF AND CAAF

3.1 WAAF noted that given sufficient demand or incentive, substantial supplies of jet fuel that offer a significant reduction in life-cycle CO<sub>2</sub> emissions could be available within 10 years. CAAF concluded with a Declaration, Recommendations and the Global Framework for Aviation Alternative Fuels (GFAAF). The GFAAF is a public communication tool that is maintained by the Secretariat that highlights the current and projected activities related to the implementation of sustainable alternative fuels for aviation as an element of ICAO's environmental protection strategy. The GFAAF is updated whenever new information is provided by States and Observer organizations and is available at [www.icao.int/AltFuels](http://www.icao.int/AltFuels).

3.2 CAAF also resulted in a number of key accomplishments in the area of standardized definitions and processes, including:

- a) adopting the Fuel Readiness Level (FRL), developed by the United States Commercial Aviation Alternative Fuel Initiative (CAAFI), as a best practice;
- b) defining drop-in jet fuel blend and drop-in neat jet fuel;
- c) recommending the use of life cycle analysis as the appropriate means for comparing the relative emissions from alternative jet fuels to conventional jet fuel; and
- d) endorsing the use of the existing industry qualification and certification processes as the appropriate means for approving a new alternative jet fuel.

### 4. CHALLENGES

4.1 The cost and availability of sustainable alternative fuels for aviation remain key barriers to their large scale adoption. The testing of new fuels and the establishment of new production facilities require significant capital investment. In addition, since aviation represents less than 5 per cent of the world's liquid fuel consumption, it is possible that fuel producers may initially target larger markets. If the use of alternative fuels is to be part of a comprehensive strategy for minimizing the effects of aviation on the global climate, regulatory and financial frameworks need to be established to ensure that sufficient quantities of alternative fuels are made available to aviation.

4.2 As requested by CAAF, ICAO has entered into preliminary discussions with the World Bank and Inter American Development Bank to consider a framework for financing infrastructure development projects dedicated to aviation alternative fuels and incentives to overcome initial market hurdles. Furthermore, WAAF noted that the adoption of alternative fuels by aviation might be simpler than for other sectors due to the relatively small number of fuelling locations and vehicles and that aviation is a unified and committed industry buyer due to the single type of fuel used by its turbine powered equipment that will continue to use liquid fuel for the foreseeable future.

4.3 The definition of sustainability criteria will determine the types of feedstocks and processes used to provide alternative fuels in the future. Presently, there is no set of internationally accepted sustainability criteria; however, as noted by CAAF, this issue is not exclusive to aviation. The Conference recommended that ICAO should identify and work with the appropriate international bodies on the development of sustainability criteria for alternative aviation fuels.

## 5. ICAO'S ROLE IN SUSTAINABLE ALTERNATIVE FUELS FOR AVIATION

5.1 Since the last Assembly, ICAO has been facilitating on a global basis, the promotion and harmonization of initiatives that encourage and support the development of sustainable alternative fuels for international aviation. The following summarize the key activities in which ICAO can be engaged to promote this objective:

- 1) providing fora for education and outreach on sustainable alternative fuels for aviation;
- 2) providing fora for facilitating the exchange of information on financing and incentives for sustainable alternative fuels for aviation programmes working with the relevant UN and regional financial entities;
- 3) encouraging the establishment of a regulatory framework that assures sufficient quantities of sustainable alternative fuels are made available to aviation;
- 4) encouraging the development of standardized definitions, methodologies and processes to support the development of sustainable alternative fuels for aviation, taking into consideration the work that has been done so far in this area; and
- 5) supporting a platform for access to research roadmaps and programmes.

## 6. CONCLUSIONS

6.1 The High-level Meeting on International Aviation and Climate Change and the Conference on Aviation and Alternative fuels recognized the potentially significant environmental benefits that sustainable alternative fuels for aviation could offer. However, CAAF also noted that today only very limited quantities of alternative fuels are available to aviation.

6.2 As a result, there is a need to accelerate the appropriate development and deployment of sustainable alternative fuels for aviation. International policies are needed to facilitate on a global basis the harmonization and promotion of initiatives, as part of an overall strategy to mitigate the effects of civil aviation on the global climate.

6.3 A draft policy for sustainable alternative fuels for aviation is contained in the Assembly text A37-WP/25, *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*.