



WORKING PAPER

CONFERENCE ON AVIATION AND ALTERNATIVE FUELS

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Agenda Item 4: Defining the ICAO vision on aviation alternative fuels and future objectives

PROPOSED ICAO VISION ON AVIATION ALTERNATIVE FUELS

(Presented by the ICAO Secretariat)

SUMMARY

This paper outlines the proposed ICAO Vision on Aviation Alternative Fuels, which has the objective of inspiring States to transition to the extensive use of sustainable aviation fuels in international aviation. To achieve this objective, ICAO Member States and stakeholders will need to take significant steps in coordination with one another. This Vision will be a living instrument; the progress towards achieving it will be regularly assessed through a stocktaking process, in order to encourage States to take action at national and international levels to further develop and deploy sustainable aviation fuels.

Action by the conference is in paragraph 5.

1. INTRODUCTION

1.1 The 39th Session of the ICAO Assembly reiterated the global aspirational goals for the international aviation sector of improving fuel efficiency by 2 per cent per annum and keeping the net carbon emissions from 2020 at the same level, as established at the 37th Assembly in 2010, and recognized the work being undertaken to explore a long-term global aspirational goal for international aviation in light of the 2°C and 1.5°C temperature goals of the Paris Agreement. The 39th Assembly also recognized that the aspirational goal of 2 per cent annual fuel efficiency improvement is unlikely to deliver the level of reduction necessary to stabilize and then reduce aviation's absolute emissions contribution to climate change, and that goals of more ambition are needed to deliver a sustainable path for aviation¹.

1.2 To achieve international aviation's global aspirational goals, a comprehensive approach, consisting of a basket of measures including technology and standards, sustainable aviation fuels (SAF), operational improvements and market-based measures to reduce emissions, is necessary. The further deployment of SAF, is thus one of the initiatives that can contribute to the goal of carbon neutral

¹ Doc 10075, *Assembly Resolutions in Force* (as of 6 October 2016), available at https://www.icao.int/Meetings/a39/Documents/Resolutions/10075_en.pdf

growth for international aviation from 2020, as well as to contribute to the social and economic development associated with the UN Sustainable Development Goals (SDGs).

1.3 Since the first ICAO Conference on Aviation and Alternative Fuels (CAAF/1) in 2009, the SAF industry has made significant progress, as registered in the several initiatives and achievements shared during this Conference. Collaboration has been growing, partly as a result of ICAO's action in bringing stakeholders together and facilitating their dialogue. These developments have established a solid foundation upon which to build a robust SAF industry.

1.4 To succeed with global development and deployment of SAFs, and with the aim of ensuring that actions of ICAO Member States and stakeholders are aligned, it is necessary to establish a Vision on SAFs that encourage States to take action at national and international levels.

1.5 The information shared in this Conference shows that the challenges associated with the SAF industry are many, and that they will require concerted efforts in technology, financing, and policy to be overcome. As quoted during the Seminar on Alternative Fuels, "the best way to predict the future is to create it", and the information provided in the Conference and through the Vision provides the path to achieving the sustainable aviation future to which everyone aspires.

1.6 This paper outlines a proposed ICAO Vision on Aviation Alternative Fuels.

2. THE ICAO VISION ON AVIATION ALTERNATIVE FUELS

2.1 The ICAO Vision on Aviation Alternative Fuels will be a statement of developments contributing to a long-term vision of transitioning to an extensive use of SAF in international aviation. To pursue this Vision, ICAO Member States will be invited to take significant steps in coordination and with support of industry stakeholders, without the attribution of specific obligations to individual States.

2.2 In the near-term, CAAF/2-WP/06 shows that it is feasible to reach a goal of 5 Mt/year production in 2025, given current offtake agreements, conversion technologies undergoing the approval process, and the ground transportation policies being implemented by States.

2.3 In the mid and long-term, the four SAF deployment scenarios developed by CAEP (4 per cent, 28 per cent, 50 per cent and 100 per cent replacement of conventional aviation fuel (CAF) with SAF for international aviation in 2050), and described in CAAF/2-WP/06, provide potential scenarios that, based upon a number of factors, are more or less aggressive in terms of SAF use by 2040 and 2050.

2.4 Considering the trajectory observed in the alternative fuels deployment for other transport modes, such as ground transportation, it is considered appropriate to propose a mid-term SAF production waypoint of 128 Mt per year. This would mean an estimated rate of 70 new biorefineries coming into operation per year, which is a rate of growth that has been as observed in the global ethanol and biodiesel industries recently and informed in CAAF/2-WP/06. However, given the price difference between SAF and conventional aviation fuel, progress towards this waypoint would require States in different world-regions to put in place production and consumption incentives that respond to their unique needs.

2.5 For the long-term timeframe, the assumptions underlying the 28 per cent substitution scenario in 2050 are less aggressive when compared with the ones underlying the 100 per cent substitution scenario. However, in the long term, several accomplishments have the potential of significantly increasing the SAF deployment rate in a way not foreseen when these scenarios were

developed by CAEP. For example, achievements such as technology breakthroughs, favourable energy policies and use of “brownfield” facilities as outlined in CAAF/2-WP/06 may significantly increase the availability of SAF. With full State support, and the momentum of these possible accomplishments, a 50 per cent SAF replacement can thus be envisaged as the inspirational ICAO Vision 2050.

2.6 Table 1 summarizes this short-term goal, mid-term waypoint and ICAO Vision 2050, which will inspire States and stakeholders to take action to further develop and deploy SAF. The ICAO Vision will provide the inspiration that will be important to channel efforts in an unified way. The assumptions underlying the ICAO Vision are still within the scenarios evaluated by CAEP, but would require options that go beyond the achievements foreseeable with current level of knowledge.

2.7 Together with the 2 per cent aspirational goal for improving fuel efficiency referred in 1.1, the proposed ICAO Vision on Aviation Alternative Fuels will lead ICAO States towards reaching the agreed aspirational goal of carbon-neutral growth from 2020. The ICAO Vision will be a living instrument; progress towards achieving this vision will be regularly assessed through a stocktaking process which will allow the mid-term waypoint to be adjusted in light of the progress observed in the SAF industry.

Table 1. ICAO Vision on Aviation Alternative Fuels

	Short-term goal (2025)	Mid-term waypoint (2040)	ICAO VISION 2050
SAF use in international aviation (Mt/year)	5	128	285
SAF share in international aviation fuel demand	2%	32%	50%
% CO₂ reduction from SAF use in international aviation	0.9%	12%	33%

2.8 The following chapters provide further details on the developments that may contribute to reach greater deployment of SAF in international aviation, in the direction of achieving the ICAO Vision on Aviation Alternative Fuels.

3. SHORT-TERM DEVELOPMENTS UP TO 2025

3.1 ICAO Member States will reach international agreement on SAF sustainability criteria and life cycle greenhouse gas emissions evaluation and the associated monitoring, reporting, and verification, as part of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) Standard development process (2021), addressing some of the uncertainties faced by industry and fostering confidence in the needed investments in SAF production. Member States continue to support CORSIA to ensure there is an approach that will foster SAF production and purchase.

3.2 State plans to develop and produce SAF will be communicated to ICAO as part of State Action Plans, which will allow ICAO to qualitatively analyse the trends for future use of SAF.

3.3 In the spirit of the ICAO “No Country Left Behind” campaign, ICAO will continue to facilitate communication of initiatives and promotion of the development of partnerships between ICAO

Member States, including the sharing of information and best practices related to the development of supply chains for SAF.

3.4 ICAO Member States should set policies that strongly incentivize SAF production, in accordance with national circumstances. This includes policies that facilitate the following developments towards reaching cost-parity between SAF and CAF, with the support of industry stakeholders:

- a) Fostering the development of coordinated approaches in national administrations and financial support, including public-private partnerships;
- b) Adopting policies aiming at prioritizing the use of SAF or, at a minimum, guaranteeing a level playing field between aviation and other transportation sectors;
- c) Encouraging the repurposing of existing infrastructure that is un- or under-used (i.e., brownfield facilities) for the production of SAF;
- d) Encouraging the shifting of more refining capacity towards production of SAF, as electrification of ground transportation continues;
- e) Encouraging research and approval of new pathways for SAF production that includes higher blend rates for SAF use and simplification of the approval of future SAF pathways;
- f) Fostering sustainable increase in arable land availability, agricultural yields, fuel production efficiency, and agricultural and forestry residue removal;
- g) Promoting collaborative initiatives among ICAO Member States;
- h) Endeavouring efforts to reduce the life cycle environmental impacts of existing SAF;
- i) Identifying markets for higher value co-products that result from SAF production;
- j) Optimization and integration of the overall SAF supply chain;
- k) Supporting off-take agreements between airlines and SAF producers; and
- l) Supporting international airports in their efforts to commercialize SAF.

3.5 ICAO will schedule regular workshops, leading up to CAAF/3 in 2025 to take stock of progress towards the ICAO Vision, by assessing the effectiveness of the policies put in place by States, the financial situation of the SAF industry, and the technological evolution in SAF production. With the lessons-learned from the implementation of these developments, ICAO and Member States will be in a position to assess progress towards the mid-term waypoint and ICAO Vision 2050.

4. ICAO VISION - DEVELOPMENTS UP TO 2050

4.1 The portfolio of approved SAF will need to be expanded and include fuels that can be blended with conventional jet fuel at any level (i.e., no blending limits), and include approval for the use of fuel produced by traditional refineries that incorporate biomass into their existing production processes.

4.2 Several additional pathways for fuel production will need to be in place, allowing most ICAO Member States to locally produce SAF types tailored to their specific local conditions, as this should improve the cost effectiveness of SAF.

4.3 Transition to electrification for ground transportation will need to have largely occurred, along with effectively re-tooling refineries and other industrial facilities for SAF production. Policy and regulations will need to be in place such that SAF have a level playing field with other users of biomass such as ground transportation, bio-power, and bio-materials.

4.4 Production of SAF will need to be highly efficient to ensure the efficient capture and beneficial reuse of wastes and surplus energy in order to drive more efficient use of biomass, and minimize waste generation.

4.5 Innovation in agricultural practices will need to continue to allow growth of feedstocks for SAF. Further, novel, integrated systems that efficiently and sustainably generate food, feed, fibre, and fuel will also need to be developed. SAF will have to approach or achieve cost-parity with petroleum-derived fuel, driven by, for example, significant improvements in feedstock production and extraction, as well as fuel production.

5. ACTION BY THE CAAF/2

5.1 The CAAF/2 is invited to:

- a) acknowledge the role of SAF in the context of the ICAO global aspirational goals for international aviation;
- b) agree on the proposed stocktaking process to assess progress towards the ICAO Vision;
- c) encourage States to implement the proposed developments in policy, technology and financing in order to achieve the 2025 short-term goal;
- d) agree on the proposed mid-term waypoint (2040);
- e) agree on the proposed ICAO Vision 2050; and
- f) encourage States to work together and with stakeholders to identify and implement necessary policy, technology, and financing to progress towards the ICAO Vision.

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