



THIRD CONFERENCE ON AVIATION AND ALTERNATIVE FUELS (CAAF/3)

Dubai, United Arab Emirates, 20 to 24 November 2023

- Agenda Item 1: Setting the scene – Latest developments in cleaner energy technology for international aviation and its contribution to the Long-Term Global Aspirational Goal**
- Agenda Item 2: Supporting policies to promote the development and deployment of cleaner energy for aviation**
- Agenda Item 3: Assistance and capacity building for cleaner energy**
- Agenda Item 4: Financing cleaner energy**
- Agenda Item 5: Reviewing the 2050 ICAO Vision for SAF, including LCAF and other cleaner energy for aviation, in order to define a global framework**

ICAO INDUSTRY CONSULTATIVE FORUM (ICF) SECOND MEETING REPORT

(Presented by the ICAO Secretariat)

SUMMARY

This paper provides background information on the report of the second meeting of the ICAO Industry Consultative Forum (ICF), which was held on 21 March 2022 with a focus on Sustainable Aviation Fuels (SAF) and Lower Carbon Aviation Fuels (LCAF).

1. INTRODUCTION

1.1 The ICF was established by the ICAO Council in response to Assembly Resolution A40-27 Innovation in Aviation, operative clause 5, which “Directs the Council to urgently consider the establishment of a high-level body with the industry to regularly provide strategic advice to the Council concerning innovation in aviation” (C-DEC 221/9 refers). On 21 March 2022, the second meeting of the ICAO-Industry Consultative Forum (ICF) was held virtually, with the participation of 19 panelists comprising stakeholders from various segments of the aviation industry (manufacturers, fuel producers, airport operators and airlines) and from diverse geographical regions. Ms. Nancy Young, former Vice President of Environmental Affairs at Airlines for America moderated the second meeting of the ICAO ICF.

1.2 The meeting focused on Sustainable Aviation Fuels (SAF), and Lower Carbon Aviation Fuels (LCAF), recognizing their key role in the sector's decarbonization efforts; and aimed at allowing the industry to provide inputs to the ICAO Council, thereby facilitating the definition of an ICAO strategic vision for SAF/LCAF. To this end, the meeting comprised of three Panel sessions, with panelists each sharing their perspectives on the following themes: i) Experiences and lessons learned from SAF/LCAF developments in the last 10 years; and ii) Expectations regarding the evolution of SAF/LCAF moving forward. Views were sought from a list of questions related to each theme, followed by discussions. The President of the Council provided opening remarks and closing statements for the meeting. The ICAO Secretary General provided reflections and conclusions at the end of each Panel session.

1.3 The purpose of this report is to provide an overview of the key points raised and discussions across the three Panel sessions, identifying possible areas in which ICAO could play a role in the development of SAF/LCAF in international aviation, and possible elements that could be included in an ICAO strategic vision and policy for SAF/LCAF.

2. **THEME I – EXPERIENCES AND LESSONS LEARNED**

2.1 The first theme of the panel session focused on lessons learned from SAF/LCAF developments in the last 10 years, leveraging on this experience to discuss next steps to ramp up SAF/LCAF production.

2.2 Lessons learned that are essential for the development of a SAF/LCAF sector

2.2.1 All panelists expressed the need for aviation to decarbonize. They were of the view that the technical aspects to support a SAF/LCAF sector were already in place, noting the good progress across the past decade, which had brought about certification of numerous SAF pathways – as such, continued coordination in technical aspects would be crucial. Some noted that the development of a SAF/LCAF sector was a multi-stakeholder, ecosystem level effort, involving Original Equipment Manufacturers (OEMs), airlines, airports, governments etc. collaborating in ramping up the SAF/LCAF market.

2.2.2 All panelists agreed on the challenges the SAF market is facing, whereby the low volumes available were not generating a dynamic for high demand and were keeping costs at a high level.

2.2.3 It was also noted that the ramping up of SAF production would require strong supporting policies and incentives that could strengthen the SAF business case in a harmonized manner so SAF are available worldwide. De-risking of capital to allow industrial scaling up of SAF production would provide opportunities for economies of scale to be reaped. The need for SAF/LCAF to be competitive was mentioned, which would necessitate policies to ensure that stakeholders were not disadvantaged from being early SAF/LCAF adopters.

2.2.4 Apart from a consistent approach towards the application of sustainability criteria in the evaluation of life cycle emissions across various SAF feedstock/pathways, one panelist was of the view that the same needs to be considered for newer technology options (e.g. hydrogen, electric aircraft).

2.2.5 In response to a question regarding how incentives for SAF development may be differentiated, it was noted that one of the issues hampering SAF production was the mismatch between SAF technology developers, which were often very small companies, vis-à-vis the nature of SAF production at scale, where significant infrastructure was needed, usually the domain for much larger companies. As such, in the consideration of supporting policies, having a focus on the interplay between

various stakeholders would be crucial. Another panelist also noted regional variations in resources that could impact SAF development (e.g. renewable energy sources, feedstock availability), and how policies may be customized accordingly.

2.2.6 Cost considerations/concerns were also mentioned – while panelists acknowledged the huge amount of investments that would be needed to transit the sector, one noted that the financing capacity was existing and that many relevant global banks do not view funding to be an issue, and are only waiting for a clear global trajectory to unlock funding. A panelist recognized that passengers, through ticket prices, would eventually pay for costs while highlighting that SAF was regarded to be an investable green project, with clear demand from passengers. Another panelist noted that SAF technologies developed with certain feedstock could be replicated in many places, which would reduce costs/investments required.

2.2.7 On passenger demand and willingness to pay, panelists cited the case of the existing Paris – Amsterdam route where commercial flights are already regularly operating on a SAF blend, with healthy demand. However, they noted that a global mechanism/mandate may be needed to have all passengers pay for SAF/LCAF use. Regarding the cost impact of SAF on aviation demand given its price disparity with conventional jet fuel, particularly to low/middle income countries, some panelists noted that many of the developing countries were actually rich on feedstock resources, and the creation of a new SAF sector is an economic opportunity that could potentially lead to win-win outcomes, in reducing emissions as well as raising incomes.

2.2.8 Several panelists noted that a number of the first movers in SAF production supported the development of the SAF demand market, through capacity building (education of stakeholders).

2.3 Focus of research priorities for the near and long term

2.3.1 *New pathways and processes to support SAF/LCAF production* – the panelists noted and were encouraged by the many SAF production pathways that had been certified by the American Society for Testing and Materials (ASTM) International over the past decade; however, SAF production remains low. In order to support the ramp up of SAF development and deployment, continued research into new feedstocks, pathways and production processes was essential. Co-processing and improving existing processes for LCAF production were cited as a near term opportunity, allowing the use of more sustainable feedstock, whilst requiring minimal changes to existing infrastructure. Panelists also recognized regional variations in the type of feedstock availability, where research would be required to support supply chains, as well as to optimize regional feedstock use/distribution.

2.3.2 *Approval of 100% SAF use - Moving beyond the existing 50 per cent blending limits for SAF* (i.e. eliminating blending requirements) was also mentioned by many panelists. By addressing technical issues to support 100 per cent utilization of SAF in flights will allow the sector to realize the maximum potential for drop-in SAF use. Others highlighted that existing SAF production continued to be low, and even the 50 per cent blending limits would be difficult to be reached today and therefore the scale-up of production capacities would be a more immediate priority.

2.3.3 *Synthetic aviation fuels* - Panelists also felt that more research into synthetic kerosene would be essential, with an objective to bring down its production cost in the future. Ongoing developments which could lower life cycle emissions significantly were noted, such as in renewable energy, carbon capture and storage technologies, synthetic kerosene production pathways (e.g. Power to Liquid (PtL)). Similar to feedstock availability, the issue of regional variations in access to renewable energy was also highlighted.

2.3.4 *Fuel efficiencies* – Some remarked that apart from focusing on SAF/LCAF research, it was also essential to consider continued research into aircraft energy efficiencies, i.e. conversion of fuel into thrust in flight which would offer twofold benefits: cost savings brought on by reduced fuel uplift, as well as reduced emissions.

2.3.5 *Co-benefits* – Apart from CO₂ reduction benefits, some expressed support for research into non-CO₂ impacts from SAF use, e.g. improved air quality which may further support the business case for SAF.

2.3.6 *Long-run developments* – Moving beyond drop-in fuels, panelists indicated that developing technologies for hydrogen and the electric aircraft would be essential to enable the sector to expand its emissions reducing potential beyond SAF/LCAF. As such, apart from aircraft technologies, airport infrastructure would have to evolve as well. Some panelists also viewed that SAF/LCAF and non-drop in fuel technologies do not compete and efforts should be made in developing both tracks.

2.4 How ICAO can be a driver for the development of SAF/LCAF and their use by international aviation

2.4.1 Referencing ICAO's past work in CORSIA, panelists acknowledged ICAO's sectoral leading role in coordinating action across ICAO Member States and stakeholders, raising awareness and sharing experiences on issues, as well as fostering open debates in an effort to reach consensus over harmonization of standards. One panelist mentioned that ICAO had a risk of falling behind in its efforts to drive the development of SAF/LCAF, alluding to significant progress by some States/regions which were already very active in this field, introducing SAF mandates, and other mechanisms (ReFuel EU, US fuel blenders credit, etc). Some were of the view that ICAO should promote an agenda that balances SAF/LCAF affordability and access.

2.4.2 Ongoing ICAO efforts in exploring the feasibility of a long term aspirational goal for international aviation (LTAG) were also noted, with panelists highlighting that if an LTAG was to be adopted, next steps could include coordination of roadmaps, milestones, and specific policies and actions for SAF/LCAF to support an LTAG, which may then provide additional certainty and a decisive signal for consumers and suppliers. This would also enable a stable long term business strategy for SAF development and deployment.

2.4.3 Based on the basket of measures approach, some panelists cited the need for ICAO to adopt an all-inclusive, technology agnostic approach, where all forms of SAF/LCAF should be supported equally, as long as the required sustainability criteria is met. Given the nascence of novel SAF technologies, panelists also viewed that it was not the time for ICAO to pick technology 'winners'. A panelist suggested that ICAO could broaden the eligibility criteria for SAF/LCAF; another noted that balancing the considerations of cost, technology, and timing would be essential for ICAO in driving SAF/LCAF development and deployment.

2.4.4 Some panelists also mentioned that ICAO had a role to level the playing field, and balance socio-economic and sustainability objectives – one panelist highlighted challenges for airlines in implementing SAF, especially in States where related standards, production, and incentive support were less established. Suggestions for ICAO to be the clearing-house of SAF/LCAF related information was also raised.

3. **THEME II – MOVING TO THE FUTURE**

3.1 The second theme of the panel session focused on expectations regarding the evolution of the aviation business over the next 30 years, particularly on SAF/LCAF, initiatives toward its development and deployment, and how States could work with industry to support the energy transition.

3.2 Measures to promote the development and use of SAF/LCAF

3.2.1 Panelists indicated that airlines were often keen to invest in SAF projects, as opposed to offsetting, but appropriate incentives needed to be in place to support SAF adoption. One cited the example of London Heathrow Airport that when voluntary incentives for the use of SAF were introduced, it was oversubscribed by airlines. Some panelists also observed that, as more companies factored in the cost of carbon into their business decisions, demand for SAF adoption would pivot. Financial support encouraging capital to flow in the scaling up of SAF production was highlighted, which may take the form of subsidies, tax incentives, supporting first movers, etc. In addition, streamlining certification of SAF/LCAF would also further promote its development.

3.2.2 The need for SAF mandates was mentioned by many panelists, as it would send a clear demand signal and de-risk investments into production. A mandate would soften the impact of the higher cost of SAF in the early years, whilst waiting for its production costs to come down as economies of scale are reaped. A few panelists felt that ICAO had a role to play in the harmonization of SAF blending mandates around the world, or adopting a global blending mandate for international aviation of 10 per cent in 2030 and 30 per cent in 2040, as well as setting a clear global regulatory framework in order to create a level playing field.

3.2.3 Some panelists noted however that not all States would welcome mandates, providing reasons where States often had varying levels of local SAF/LCAF development, and any introduction of a mandate would have detrimental impacts on aviation demand, given high SAF prices. As an alternative, consumer alliances and incentive schemes were suggested as useful means in providing meaningful quantities, and certainties regarding SAF/LCAF demand. One panelist cited an example of the US SAF blenders tax credit, which helped to create a level playing field between renewable diesel and SAF. Other measures suggested to include a price stability mechanism, which could address issues in SAF relating to high costs.

3.2.4 Some panelists attempted to resolve the differences in views between mandates and incentives/subsidies by highlighting that there were pockets of success in each approach, and that there was not a “one size fits all” solution. As such, States should therefore be encouraged to adopt measures that best suits their needs.

3.3 What should be done to ensure financing, a level playing field, and availability of SAF/LCAF for aviation

3.3.1 Opinions on financing were varied. Some panelists emphasized that a decarbonization trajectory as well as a global SAF strategy would unlock funding from banks and financial institutions. In this regard, one panelist underlined that a carbon neutrality goal by 2050, and clarification on the role of SAF to achieve this goal, would unlock the necessary funds.

3.3.2 Some panelists felt that targeted capital investment support directed at the SAF technology developers would be required, as they often were startups with limited access to capital – some form of de-risking would be needed in order to get their first scale production facilities operational. Others viewed that

financing support should go directly to SAF producers to accelerate production to scale, or be extended to airlines prepaying for their offtake agreements, as it was another way to inject financing into scaling up SAF/LCAF production. One felt that government decisions on financing SAF/LCAF infrastructure needed to take a more holistic perspective, as production facilities often produced more than just jet fuel, and had catered to other sectors as well – these synergies needed to be considered.

3.3.3 Following a question on whether government subsidies would be realistic given existing tightened fiscal constraints, panelists were of the view that subsidies would be useful in enabling new technologies to emerge, allowing them to attain sufficient competitiveness to then compete in the market. Nonetheless, it was acknowledged that subsidies would likely be more prevalent in developed states/regions with less fiscal pressures. Also, it was noted that subsidies were not needed for SAF pathways that were already established.

3.3.4 Some panelists felt that a sustainable financing taxonomy would be useful, given the complexities of SAF/LCAF developments. Such a framework, established in a visible and standardized manner would help investors obtain the required clarity needed to make informed decisions. A panelist commented that a broader view on feedstock was needed, alluding to existing definitions in the EU, which in their view was too narrow.

3.3.5 Another felt that, as a complement to a mandate, a book and claim sustainability accounting approach, where sustainability claims could be separated from the physical flow of SAF could provide a level playing field in providing access to the environmental benefits, in areas where SAF may not be physically available. Nonetheless, issues concerning double-counting, or double-claiming had to be addressed.

3.3.6 In response to a question on how airports may support SAF availability and demand, examples of Stockholm Arlanda Airport, London Heathrow Airport and Amsterdam Schiphol Airport were cited, where incentives had been set up to encourage airlines to uplift fuel. However, panelists also noted that airlines and SAF producers remained the key stakeholders in any initiatives, given that they formed the supply and demand for SAF.

3.3.7 Highlighting the need for increased cooperation and partnerships among stakeholders, one panelist suggested that ICAO could help to establish industrial alliances aimed at developing the production and uptake of SAF.

3.3.8 Panelists recognized the local vis-à-vis global interplay of measures in supporting SAF, and noted that a mixture of approaches would be needed to ensure that level-playing field concerns would be addressed, balancing affordability and sustainability considerations.

3.4 Elements to be included in an ICAO Strategic vision and policy for SAF/LCAF

3.4.1 Some panelists felt that ICAO should establish an ambitious LTAG, in order to set the basis for the underlying efforts driving technology, operations and fuel (SAF/LCAF) developments, and encourage financing into the sector. In this regard, some panelists supported a net zero goal for 2050. Other panelists supported the adoption of intermediate milestones.

3.4.2 Panelists viewed that ICAO's Strategic vision and policy for SAF/LCAF, had to include the establishment of a global framework, include harmonized policies and incentives, and address ways to avoid market distortions and an unlevelled playing field. Support for technical coordination was also highlighted, especially in the certification of new SAF pathways. Interim targets were also suggested. In

addition, panelists felt that ICAO should set out global harmonization for SAF sustainability criteria – it recognized that ICAO was already well established in this field, but with the introduction of additional SAF pathways, development of synthetic fuels, and growing options beyond drop-in fuels, increased coordination and harmonization of standards would be essential.

3.4.3 Some panelists noted the uneven pace of SAF/LCAF developments across the world, where some States/regions could be advancing faster than others, and hence suggested that ICAO could set out pathways and goals for SAF/LCAF development, in recognition of each States/region’s resources and capabilities.

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