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ICAO'S ROLE IN SUPPORTING THE ENERGY TRANSITION TO SUSTAINABLE AVIATION FUELS

(Presented by Airports Council International (ACI), Civil Air Navigation Services Organisation (CANSO), International Air Transport Association (IATA), International Business Aviation Council (IBAC) and International Coordinating Council of Aerospace Industries Associations (ICCAIA) coordinated by Air Transport Action Group (ATAG))

EXECUTIVE SUMMARY

The information paper supports A41-WP/466 which details the industry's view that adoption of a long-term aspirational goal for international civil aviation is critical to supporting industry action to address its climate impacts and enable it to achieve net-zero carbon emissions by 2050. This paper outlines some of the steps ICAO can take to build on previous work on sustainable aviation fuel (SAF) deployment and enhance industry efforts to undertake this transition by mid-century.

1. INTRODUCTION

1.1 In October 2021 the collective air transport industry raised its climate ambition with a new long-term commitment: net-zero carbon by 2050, supported by accelerated deployment of a comprehensive programme of effective emission reduction, energy transition and innovation across the aviation sector and in partnership with governments around the world.

1.2 The industry invites Governments meeting at ICAO to adopt a sector-wide long-term aspirational goal for aviation climate action, in line with the Paris Agreement stretch goal of 1.5ºC and backed by the latest scientific advice on limiting the worst impacts of climate change

1.3 Reaching that agreement, and operationalising it at a global level, will require a global effort including a significant and rapid shift towards new forms of sustainable energy.

1.4 This paper outlines some of the possible actions ICAO and its Member States can undertake to assist in the energy transition, specifically related to the build-up of sustainable aviation fuels around the world, in support of industry efforts. Some of these will be implementable through the ICAO structure and processes, some will need to be undertaken at a national or regional level. A separate paper (A41-WP/545) outlines possible options that should be considered as means of implementation of a long-term aspirational climate goal for air transport, and A41-WP/477 considers the cost of shifting to net-zero by 2050.

2. CURRENT STATUS OF DEPLOYMENT

2.1 Since sustainable aviation fuel first started being regularly supplied at Los Angeles Airport in March 2016, both the supply and demand for SAF has increased significantly. Even during the difficult period of shutdown created by COVID-19, SAF offtake agreements increased significantly. At present, SAF deployment includes:

2.2 295 million litres (236,000 tonnes) will likely be delivered into the system in 2022, representing less than 1% of the global fuel supply.

2.3 Airlines, operators and corporate partners have around $25 billion in forward purchase agreements for SAF, an increase from $6 billion pre-COVID.

2.4 There are currently 15 production facilities under construction or in the final stages of financing or planning, with a total production volume potential of 5 billion litres (4 million tonnes), due to come online. If that production was prioritised towards SAF (and not road transport), then by 2025, it would supply up to 2% of global jet fuel use.

2.5 In the past year, 27 airlines have announced prominent aspirational goals for SAF offtake, most of which are for 10% of fuel use in 2030 to be from SAF[1]. In addition, 53 airports are already distributing SAF on a regular basis.

2.6 Based on current estimates of production, commitments from airlines and announced policy in the United States and Europe, by 2030 around 6.5% of global jet fuel will be SAF.

3. WHERE WE NEED TO BE IN 2050

3.1 There is clear momentum towards more supply and offtake of SAF over the coming years. But there is a need to accelerate this progress significantly, particularly in the coming decade, to reach the levels of SAF uptake needed by 2050.

3.2 The industry's *Waypoint 2050* report[2] identified several potential trajectories for SAF deployment to provide the industry with a good chance of reaching net-zero carbon by 2050, all of which require around 90% of the liquid fuel mix to be SAF (average 100% emissions reduction factor) by 2050.

3.2.1 Emissions reduction potential of SAF on a lifecycle basis continues to improve. The current global average of around a 70% reduction compared with fossil fuels will shift towards an average of around 80% in the coming years. Industry expects this to continue to rise. *Waypoint 2050* uses a global average lifecycle emissions reduction of 100% by 2050, based on the understanding that some production pathways may average much higher than this.

3.2.2 The highest estimate will require 555 billion litres (445 million tonnes) of SAF to be delivered per year by 2050. The lowest estimate (for the Waypoint S3 scenario, where aspirational

[1] For example: OneWorld members Alaska Airlines, American Airlines, British Airways, Cathay Pacific, Finnair, Iberia, Japan Airlines, Malaysia Airlines, Qantas, Qatar Airways, Royal Air Maroc, Royal Jordanian, S7 Airlines and SriLankan Airlines; additional IAG carriers Level, Vueling and Aer Lingus; ANA, Delta Air Lines, DHL, KLM, SpiceJet, United Airlines, Virgin Atlantic, Air New Zealand and LATAM (at 5% in 2030). Ryanair has committed to 12.5% SAF blend in its fleet by 2030.

[2] www.aviationbenefits.org/W2050

technology is able to contribute a larger proportion of carbon reductions) is for 410 billion litres (330 million tonnes). A mid-level estimate (S1) puts required volumes at 480 billion litres (or 380 million tonnes).

3.2.3 In the ICAO LTAG analysis for the F3 scenario, SAF supplies 96% of international jet fuel demand in 2050 (around 88 billion litres, or 265 million tonnes of SAF) with the remaining 4% of conventional drop-in jet fuel demand replaced by non-drop-in fuel (hydrogen). SAF produced from waste and direct air capture power-to-liquids supplies over half of the drop-in demand.

3.3 Analysis for the industry shows that, whilst challenging, these levels are achievable based on a conservative assessment of feedstock availability at a global and regional level (with an evolution from current sources towards power-to-liquid as the most prominent source of SAF), using stringent sustainability criteria. Importantly, States and the wider energy industry will need to significantly boost low-carbon electricity production for a range of climate-related uses, including the production of both PtL SAF and hydrogen.

3.4 The *Fueling Net Zero* report[3] also outlines the opportunities of SAF production build-up in countries all over the world, with potentially 14 million jobs created or sustained by the shift to SAF.

3.4.1 On a regional basis, the opportunities to support employment are: Africa up to 1.2 million jobs; Asia-Pacific up to 5.9 million jobs; Europe up to 2.5 million jobs; Latin America and the Caribbean up to 2 million jobs; Middle East up to 400,000 jobs; and North America up to 2.1 million jobs.

4. CAAF/3 – A CHANCE TO AGREE AN ASPIRATIONAL GOAL FOR SAF DEPLOYMENT?

4.1 Following adoption of a long-term goal at the 41st ICAO Assembly in 2022, a number of elements will need to come together to ensure the goal can be achieved. A41-WP/545 outlines some of the means of implementation that could be explored for delivering a long-term goal at a global level. Given the technological (but not economic) maturity of SAF as a decarbonisation pathway, emphasis should be placed on accelerated policy and investment action in the coming 10-15 years in particular to support the production and use of SAF.

4.2 Establishment of a global goal for sustainable aviation fuel deployment at the upcoming Third ICAO Conference on Aviation Alternative Fuels (CAAF/3, expected to be scheduled for 2023) will provide a more tangible set of targets and globally harmonised ambition that could help unlock investment in SAF deployment. Such goals, whilst necessarily aspirational at a global level, could help set regional or national ambition and action plans. Most importantly, they send a signal to the investment markets about future demand, from aviation, for new energy solutions.

4.3 Based on *Waypoint 2050* analysis, by 2050 aviation would need to have almost completely replaced fossil jet fuel with SAF (around 90% of the fuel supply at an average 100% emissions reduction factor) in order to work towards net-zero emissions.

4.4 In order to achieve a necessary transition curve for SAF, it will also be important to set milestone goals in order to provide short- and medium-term focus for production and deployment.

[3] www.aviationbenefits.org/W2050

4.5 Member States are asked to work with technology providers to ensure 100% SAF use is compatible with aircraft and other equipment.

4.6 Low Carbon Aviation Fuels (LCAF, as foreseen in the CORSIA framework) provide a useful immediate reduction in carbon emissions and as much of the fossil fuel supply should be LCAF as soon as practical, particularly whilst SAF blend limits remain. However, LCAF should only be considered a transition opportunity whilst SAF is able to be matured and deployed at scale: it is not a long-term aviation decarbonisation option.

5. ENABLING FACTORS

5.1 Policy options

5.1.1 Several policy guidance toolkits have already been developed, including the ICAO *Guidance on Potential Policies to Advance the Deployment of Sustainable Aviation Fuel* and the *Sustainable Aviation Fuel Policy Toolkit*[4]. These provide a useful menu of policy options, but each policy should be developed in a national context and with local industry stakeholder guidance to ensure the optimum policy framework for each State, but where possible having consistency of policy to encourage SAF deployment and avoid impacts on competition between operators.

5.1.2 Industry's preferred policy options include a package of measures that both stimulate demand and also underpin supply. Positive policies could include incentive programmes, de-risking investment in new plants, or direct financial project support, without attached obligations or regulations. Industry also favours policy options that have the potential to put the production of SAF on a more equal footing with the production of renewable fuel for ground transport. Depending on the environment, a mandate alone is not a useful tool, but a mandate backed up by demand incentives and de-risking supply mechanism could be a useful way forward. In other scenarios, production and purchase incentives have proven to be very useful for SAF (and other renewable energy) scale-up.

5.2 Book and claim mechanism

5.2.1 Book and Claim accounting represents an opportunity to accelerate SAF deployment to guarantee access to SAF to a wide range of airlines and operators and geographical locations. For this to be successful it is imperative that appropriate guiding principles governing the integrity of a book and claim system are established. Industry and non-governmental organisations are already working to create systems needed to bring robust integrity to SAF book and claim transactions, taking into account variations of SAF feedstocks, supply chains, and production technologies. ICAO could lend important technical expertise on how to manage complex global systems and especially enable regulators to work with SAF users, producers and verifiers to introduce a book and claim SAF accounting system.

5.3 Capacity building

5.3.1 Capacity building and knowledge transfer will be vital elements of ensuring equitable distribution of SAF opportunities around the world. This can be directed through ICAO ACT SAF projects, as well as direct assistance between States. Knowledge transfer opportunities between academic and research institutions in developed and developing countries could also play a role.

[4] www.weforum.org/reports/clean-skies-for-tomorrow-sustainable-aviation-fuel-policy-toolkit/

5.4 Technology transfer

5.4.1 The transfer of SAF production technologies is an important element of the distribution of SAF opportunities to all countries. Industry supports government and the energy industry exploration of these opportunities.

6. CONCLUSIONS

6.1 The industry will require significant volumes of SAF to be produced and deployed in what is a relatively short timeframe. Governments and the energy and finance sectors will need to be active in ensuring the right environment for this transition is in place. Part of that process will be facilitated by a globally harmonised approach to aspirational goals which can be established at the ICAO CAAF/3 meeting.

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