Decarbonizing aviation: How to globally promote Sustainable Aviation Fuels

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I. Status quo: The challenge for the aviation sector and for SAFs

#1 The aviation industry is far from reaching net zero emissions by 2050. Aviation is one of the only industries where emissions are expected to significantly increase over the upcoming years. Under current estimates, emissions from international aviation could increase by a factor of four by 2050 (vs. 2015)[1].

#2 Sustainable Aviation Fuels (SAFs) offer the most promising pathway to decarbonize aviation. While there are several technological innovations (e.g., aircraft efficiency, hydrogen, and electrification), SAFs are one of the largest contributors to all net zero strategies. They are particularly important for medium- and long-haul flights, where no other credible means for decarbonization exist in the near future.

#3 However, SAF production volumes fall significantly short of the levels required to meet the decarbonization commitments and aspirations of both industry and governments, jeopardizing aviation's green transition. Currently, global production remains insufficient, with announced projects covering only 30 – 40% of global fuel supply in 2030[2]. Considering the time needed to ramp up capacities, securing the necessary investment decisions before 2026 is crucial. If this production gap remains unaddressed, the aviation sector will fail to decarbonize on the scale required to reach net zero emissions by 2050.

#4 Regulatory uncertainty and globally fragmented SAF policies impede the market conditions needed for large-scale SAF investments, contributing to high prices and hesitance within the SAF industry. While there has been progress in promoting SAF usage, current cost differentials and existing policy incentives remain far off the mark in bringing forth the market conditions necessary for large-scale SAF investments. SAF regulation, which is in its very early stages compared to other aspects of climate policy, is not only highly fragmented across countries, but also restrictive towards certain SAF feedstocks, limiting overall supply. Regulatory uncertainty, particularly around the qualification of certain crop-based feedstocks, has caused major players to announce significant pauses or reductions in their SAF projects. Given the central role of SAFs in greening aviation, this trend could set back the sustainable transition of this industry by decades if left unaddressed.

#5 We are currently missing the opportunity to harness agriculture's potential in supplying renewable fuels that could decarbonize aviation, despite novel crop-based feedstocks resolving long-standing political concerns. Some crop-based feedstocks used for renewable fuels were at times perceived critically due to their possible impact on food security. Novel feedstocks, such as winter and intermediate oilseed crops like winter canola and CoverCress (domesticated pennycress), however, can be planted between food crop rotations and therefore contribute to renewable SAF production while enabling a coexistence of food and fuel production. They also offer environmental and socioeconomic benefits such as improved soil health and carbon sequestration, as well as new revenue streams for farmers. In addition, traditional crop-based feedstocks like corn and soy still have an important role to play in meeting growing SAF demand, especially if cultivation methods with a low carbon intensity are incentivized and taken into account. Biofuels also respect the time value of carbon, offering a renewable energy solution that can help us make significant strides in reducing our carbon footprint now respectively in the next years, not in the distant future. There is a greater benefit from reducing greenhouse gas emissions immediately than reducing the same amount in the future. The sooner we act, the more effective we will be at mitigating the impacts of climate change. These feedstocks and technologies can be promoted in new SAF regulations, helping to meet feedstock demand and boosting overall SAF supply.

[1] ICAO, 2019

[2] World Economic Forum, 2024

II. Way forward: A multilateral pledge and national policies to scale up SAFs

#6 It is now time for governments to support the aviation industry's SAF ambitions by promoting all SAF feedstocks, harmonizing regulation, and creating incentives to invest in the entire SAF value chain to ensure that we reach net zero emissions from aviation by 2050. Against a backdrop of accelerating climate change and emerging uncertainty among market actors at the same time, policymakers need to ramp up their policy ambition to create investment incentives for all SAF feedstocks and the entire SAF value chain and increase economic certainty among all involved actors.

#7 A multilateral pledge committing countries to scaling up SAF production utilizing all available SAF feedstocks – including crop-based feedstocks – would provide the much-needed political signal for reigniting large-scale SAF investments. Such pledges have been crucial in scaling green technologies in the past (e.g., Global Renewables and Energy Efficiency Pledge). By charting a clear path forward and fostering the needed cross-country harmonization as well as transition financing, a SAF scaling pledge issued in the frame of COP30 in 2025 can create the global market that SAF producers need to operate at scale. This effort could build on existing international initiatives for scaling renewable fuels, e.g., the Global Biofuel Alliance or the ICAO Global Framework for SAF.

#8 Complementary national policies supporting demand, supply, market development and standardization reinforce global ambition and bear strong standalone relevance. National policies are key to translating international commitments into actionable measures that encourage tangible on-the-ground investments and innovation in SAF production. OECD/IEA Technology Roadmaps can be helpful input for countries seeking guidance and for adopting best practices regarding national renewable fuels policies. Of course, national policies need to recognize each country's special circumstances and respective capabilities. A global pledge should therefore emphasize the necessity of a coordinated yet flexible toolbox of measures (e.g., quotas, mandates, incentives, regulation, certificates, insurances) from which countries can choose those that best fit their individual circumstances. However, heightened national SAF action is crucial in any setting – and can even prove vital for paving the way for global action.

#9 Heightened policy ambition needs to be technology neutral and promote all feedstocks as well as production technologies. All SAF feedstocks and production technologies can play a vital role in decarbonizing the aviation sector. No single pathway can provide the necessary fuel quantities to achieve net zero emissions, and arbitrarily picking winners and losers among feedstocks will only make that goal more difficult to reach. Therefore, economically viable and beneficial solutions with a high GHG-reduction impact along the entire product life cycle should be actively supported. Any incentives should be technology-neutral, promote and demonstrate quantifiable carbon reduction benefits, and/or do not otherwise create disadvantages versus non-crop feedstocks. They should at least in part reflect availability of fuel in the next years and not only focus on long-term goals against the need to act fast.

#10 The private sector stands ready to support and contribute decisively to these efforts. Already today, private actors have formed several strategic alliances across the entire value chain to effectively demonstrate the feasibility and benefits of scaling SAF production[3]. As policy frameworks improve, further private sector initiatives are set to emerge. The establishment of vital value chains delivering on GHG-emission reduction needs comprehensive strategies, based on global consent.

[3] Bayer is engaging in numerous industry-leading alliances to develop novel SAF feedstocks and scale production along the entire value chain. Bayer and Neste have recently signed a memorandum of understanding to jointly scale winter canola as a biomass-based feedstock for renewable products like biofuels. Bayer recently acquired a novel camelina feedstock from Smart Earth Camelina Corp, an intermediate oilseed crop suitable for producing low-carbon renewable fuels.