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A NEW APPROACH TO DETERMINING THE USAGE RATES OF SUSTAINABLE AVIATION FUELS BASED ON THE AMOUNT OF CO₂ EMISSION REDUCTION

(Presented by Türkiye)

EXECUTIVE SUMMARY

This information paper provides an overview of efforts within Türkiye's 2053 net-zero target, demonstrating how operational improvements and fuel efficiency measures contribute to decarbonization in the aviation sector and current efforts for Sustainable Aviation Fuels (SAF). Also, this paper highlights the standards and sustainability measures outlined in the national SAF regulation to ensure compliant use of SAF in Turkish aviation.

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| <i>Strategic Goals:</i> | This working paper relates to the Strategic Goal – <i>Aviation is environmentally sustainable</i> . |
| <i>Financial implications:</i> | N/A |
| <i>References:</i> | Sustainable Aviation Fuel Directive (SHT-SAF) |

1. INTRODUCTION

1.1 The global aviation sector is transitioning towards lower-carbon operations. In this context, Türkiye recognizes the critical role of sustainable aviation fuels (SAF) in reducing greenhouse gas (GHG) emissions from international aviation.

1.2 In addition, Türkiye has undertaken a series of operational improvements, including optimized flight procedures, enhanced air traffic management, and fuel efficiency measures, all of which contribute to significant fuel savings and emission reductions. These measures complement SAF deployment and support Türkiye's broader commitment to achieving its 2053 net-zero target.

1.3 This paper presents Türkiye's approach to SAF deployment, highlighting its national regulatory framework, compliance with international standards, and alignment with ICAO's global objectives.

2. IMPLEMENTATION OF NATIONAL REGULATION

2.1 The Directorate General of Civil Aviation (DGCA) of Türkiye has published the Sustainable Aviation Fuel Directive (SHT-SAF), which defines the principles, technical standards, certification requirements, and sustainability criteria governing the production and use of SAF. The Directive also introduces a SAF mandate for international flights departing from Türkiye.

2.2 This mandate is aligned with the outcome of the Third ICAO Conference on Aviation and Alternative Fuels (CAAF/3), which set the global objective of achieving a 5 percent reduction in CO₂ emissions for international aviation by 2030.

2.3 To ensure achievement of this objective, annual interim targets have been established. The first target, applicable from 2026, has already been published. In recognition of uncertainties regarding global SAF supply, initial targets have been set at an achievable level, taking market conditions into account. These annual targets will be progressively increased in accordance with SAF market developments, ensuring that the final ICAO target is achieved by 2030.

2.4 The Directive introduces a new methodology for quantifying emission reductions achieved through SAF use. This methodology takes CO₂ emissions from conventional jet fuel (expressed in grams per liter) as the baseline reference, and requires SAF blends to achieve measurable reductions relative to this baseline.

2.5 In accordance with this methodology, DGCA publishes annually the minimum emission reduction per liter of SAF-blended fuel. This value, applicable from 1 January to 31 December of each year, is announced on the official DGCA website before the end of the third quarter of the respective calendar year.

2.6 This calculation illustrates the methodology used under the Directive to determine the minimum annual reduction requirements:

EXAMPLE CALCULATION (2026)

Jet A-1 Typical Density: 0.80 kg/L

Lower Heating Value (LHV): 43 MJ/kg

Carbon Intensity (CI): 73.5 gCO₂e/MJ (well-to-wake, combustion only)

Reference emissions from conventional Jet A-1:

Emissions per kg fuel: $73.5 \times 43 = 3.16 \text{ kg CO}_2\text{e}$

If 1 ton Jet A-1 \approx 1,250 L, then per liter emissions = 2.528 kg CO₂e

Scenario for 2026 target (0.5% reduction):

Emissions per liter SAF blend = 2.515 kg CO₂e

Reduction per liter = $2,528 \text{ g} - 2,515 \text{ g} = 13 \text{ g CO}_2\text{e}$

2.7 Türkiye has not defined the SAF mandate in terms of a fixed percentage of fuel use. Instead, the national approach sets the requirement as a minimum CO₂ emission reduction per liter of fuel, expressed in grams, relative to conventional jet fuel. Under this framework, the blending ratio of SAF is determined by the airline operator depending on the type and life-cycle assessment (LCA) value of the SAF feedstock selected. The established reduction target may therefore be achieved either through:

- higher blending ratios of SAF produced from feedstocks with relatively higher LCA values, or
- lower blending ratios of SAF produced from more environmentally friendly feedstocks with lower LCA values.

2.8 This system provides airlines, producers, and suppliers with flexibility in implementation, while at the same time creating an incentive for the use of low-LCA, environmentally sustainable feedstocks in SAF production and supply.

3. CONCLUSION

3.1 Türkiye has taken concrete steps to align its national SAF regulatory framework with ICAO's global objectives and the implementation requirements of CORSIA. Through the adoption of the SHT-SAF Directive, Türkiye ensures that technical standards, sustainability criteria, and certification procedures governing SAF production and use are consistent with ICAO guidance.

3.2 This regulatory framework strengthens environmental integrity, provides legal certainty for operators, and promotes the safe and sustainable integration of SAF into national and international aviation operations.

3.3 Türkiye's progressive and transparent approach demonstrates its strong commitment to contributing to ICAO's climate goals while supporting the global energy transition in aviation.

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