

Can the EU ETS Close the SAF Cost Gap? An Optimisation Analysis of the Allowance Support Mechanism Under ReFuelEU Aviation

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Extended Abstract

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Abstract Summary

Sustainable Aviation Fuels (SAF) are central to aviation decarbonisation yet cost two to five times more than conventional jet fuel. To accelerate SAF uptake, the revised EU ETS Directive introduced a SAF Allowance Support Mechanism, reserving 20 million allowances (EUAs) across 2025–2030 to partially offset the price premium against conventional jet fuel. This study links that mechanism to the SAF blending mandates imposed under ReFuelEU Aviation to examine whether the mechanism is financially adequate to bridge the SAF cost gap at the volumes mandated.

This research develops a linear optimisation model across five policy scenarios, each with a distinct objective function: minimising the required carbon price path, minimising the total EUA reserved, or maximising achievable premium coverage, subject to the constraint that allowance revenue is sufficient to fund the prescribed coverage share of the SAF price premium at mandated volumes. The mechanism is designed to cover 50% of the bio-SAF price premium and 95% of the e-SAF premium.

The results show that the total support required by 2030 is €6.6 billion, against which the current design (20 million EUAs at €80/EUA) delivers only €1.6 billion, a structural financial gap of €5 billion. Closing this gap with the fixed EUA quantity requires carbon prices of €190–893/EUA; fixing the price at €80/EUA instead requires 83 million EUAs, falling to 48 million under a rising price trajectory. Where coverage rates are the decision variable, bio-SAF support is constrained to 16–21% under fixed parameters and 26–29% under a rising carbon price; e-SAF reaches 28% and 57% respectively, though meaningful support remains absent before the 2030 sub-mandate becomes binding. Across all scenarios, closing the gap requires either a fourfold EUA expansion or carbon prices far exceeding current market levels.

Presenting Author Biography

Ahmed Aljameel is an energy and climate policy researcher at the Centre for Environmental Policy at Imperial College London. His work focuses on market-based mechanisms that can accelerate the uptake of alternative drop-in fuels for aviation decarbonisation. His research brings together climate policy design, energy economics, international market frameworks, and demand-pull finance, with a regional focus on the Middle East and North Africa and the Global South.

Ahmed also serves as a Lead Author for the Intergovernmental Panel on Climate Change (IPCC) and is a nominated expert under the United Nations Framework Convention on Climate Change (UNFCCC).