ReFuelEU Aviation: T&E's recommendations

An overdue first step to reduce aviation's climate impact

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Context

Aircraft rely exclusively on fossil jet fuel to operate, which explains why growing passenger numbers have rapidly increased emissions from the sector. Carbon pricing and modal shift are important, but it's only when we swap fossil jet fuel for truly sustainable advanced fuels (SAFs) that emissions from flying will fall. Such a switch can address both CO_2 and non-CO_2 effects but to differing degrees. To date, no effective measures have been put in place at the European level to achieve such a switch. The ReFuelEU Regulation proposal changes that.

What has the European Commission proposed?

The proposal introduces an obligation on jet fuel suppliers to blend a growing share of SAFs (advanced biofuels and synthetic aviation fuels) into fuel provided at major airports in the EU. That obligation covering both types of fuels starts in 2025 at 2% and grows to 5% in 2030 and further beyond that.

- The regulation mandates the use of biofuels (both part A and B of the renewable energy directive (RED) Annex IX) and synthetic aviation fuels (e-kerosene).
- ReFuelEU excludes the use of food and feed crop-based biofuels, which have a higher emissions profile than fossil fuels and generate negative impacts on biodiversity and local communities.
- The support for e-kerosene is especially important, as it is the only fuel type that can be sustainably scaled up to meet the fuel demands of the sector.
- The mandate applies to all fuel sold in Union airports[1], therefore covering all flights including long-haul departing flights.
- The Regulation includes a financial penalty for non-compliance.

[1] Where passenger traffic is higher than 1 million departing passengers or where freight traffic is higher than 100,000 tons

What's good? What's not?

Mandating the use of SAF is essential to reduce aviation's climate impact. Covering all flights within and departing from the bloc is an important distinction from other climate measures adopted to date, such as the ETS, which has only covered flights within the EEA and departing to the UK & Switzerland (less than 40% of emissions).

The proposal will also replace existing and planned national SAF mandates, a positive step as many of them are relying on crop-based biofuels. At the same time, it remains possible for EU member states to enact policies to drive a quicker SAF uptake, including State aid, R&D funding, and industrial alliances to facilitate cooperation between all stakeholders.

The Commission has also proposed an anti-tankering provision requiring airlines to uplift from each Union airport at least 90% of the jet fuel required to perform flights from each of these airports. This is to prevent airlines from avoiding the SAF mandate by purchasing extra fuel outside of the EU. This is a concrete measure to avoid competitive distortion to the disadvantage of EU airlines

The proposal goes some way towards selecting the right types of SAFs. It excludes food and feed crop-based biofuels and instead focuses on advanced biofuels and synthetic aviation fuels.

- Advanced biofuels (part A of the RED's Annex IX): include wastes and residues, but also co-products and some primary products. There are very limited feedstocks that have no other uses and that could be used for biofuels without any significant impact on existing markets, on the environment, and the climate[2]. So the targets should be low.
- Used cooking oil and animal fats categories 1 and 2 (part B of the RED's Annex IX): they are available in very limited quantities and have a competing use with the road sector. As such, if they are not strictly limited under ReFuelEU, these feedstocks will just shift from road to aviation, and will not create additional GHG savings. When it comes to used cooking oil, there is also a risk of fraud that a high target would only increase.
- Synthetic aviation fuels: the Commission's definition of synthetic aviation fuels only includes e-kerosene which is produced from hydrogen (from renewable electricity) and captured CO_2. When the renewable electricity is additional and the CO_2 is captured from the atmosphere (Direct Air Capture (DAC)), the fuel has close to zero net CO_2 emissions. Our FAQ on e-kerosene answers some common questions on this fuel[3].

[2] Transport & Environment (2020). *RED II and advanced biofuels. Recommendations about Annex IX of the Renewable Energy Directive and its implementation at national level.* https://www.transportenvironment.org/wp-content/uploads/2021/06/2020_05_REDII_and_advanced_biofuels_briefing.pdf

[3] Transport & Environment (2021). *FAQ: the what and how of e-kerosene* https://www.transportenvironment.org/discover/faq-what-and-how-e-kerosene/

The Commission's proposal contains targets out to 2050, all of which mandate greater use of biofuels than synthetic aviation fuels. This is an unsustainable approach, as the feedstocks of biofuel are too limited to reach these high targets, while the targets for synthetic aviation fuels are far from ambitious.

How should it be improved?

Aviation urgently needs to reduce its climate impact and ReFuelEU should therefore be more ambitious. This can be achieved by correcting the imbalance between biofuels and synthetic aviation fuels so that we reach 100% SAF in 2050.

Biofuels are limited in availability and many types actually have negative environmental and climate impacts. SAF from Part B feedstocks should be capped at 0.65 Mtoe throughout the ReFuelUE period, which is equivalent to about 1.2% of aviation fuel demand. Biofuels from part A feedstocks should be mandated based on what is sustainably available, starting at 0.3% in 2025 (0.14 Mtoe)[4] and then 2.5% in 2030 (1.3 Mtoe)[5]. We have calculated the maximum availability of SAFs from part A feedstocks at 5.85 Mtoe, which is equivalent to about 10.3% of fuel demand in 2050.

For synthetic aviation fuels, the mandate should start in 2025 with a sub-target of 0.1% (small, but meaningful to provide earlier incentives to invest in production capacity) and increase it to 2% for 2030. For subsequent years, the numbers should further increase and reach almost 90% in 2050, as detailed in the table in Annex I. Furthermore, a certain share of DAC should be required from the first year of the mandate (2025) and rapidly progress to provide 100% of the CO_2 needed for synthetic aviation fuel production.

T&E recommends that: ReFuelEU's Annex I features our recommended maximum level for part B feedstocks, a target for part A feedstocks, alongside the already existing overall SAF target, and an increased minimum sub-target for synthetic aviation fuels (including a mandatory sub-share of DAC CO_2). T&E's preferred numbers are detailed in Annex I.

Demand management

European aviation traffic has grown steadily before the Covid-19 pandemic, increasing by 83% between 2005 and 2019 (in Revenue Passenger Kilometers). This trend has made it more challenging to reduce emissions, because the greater the fuel demand, the harder it is to decarbonise. Reducing passenger, and therefore fuel, demand will be key for SAFs to have a larger effect in reducing aviation's climate impact.

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[4] Cerulogy (2021). *SAFty in numbers. Considerations for setting a 2030 greenhouse gas intensity target to bring alternative fuels to EU aviation.* (Unpublished). Referenced in: Transport & Environment (2021). *E-kerosene mandate: key steps for ReFuelEU success.* https://www.transportenvironment.org/wp-content/uploads/2021/09/ReFuelEU-technical-briefingMay2021-1.pdf

[5] International Council on Clean Transportation (2021). *Estimating sustainable aviation fuel feedstock availability to meet growing European Union demand*. https://theicct.org/sites/default/files/publications/Sustainable-aviation-fuel-feedstock-eu-mar2021.pdf

The table in Annex II is based on fuel demand until 2050 that does not exceed 50% of 2019 business travel demand and 100% of 2019 leisure travel demand. The smaller fuel needs make it feasible to attain a higher SAF share in 2030, on the road to achieving 100% SAF in 2050. This highlights the need to put in place demand management measures, both in terms of kerosene taxation, proper pricing of emissions, and canceled planned airport expansion. It is also essential that companies commit to reducing corporate travel.

T&E recommends that: ReFuelEU targets can be revised upwards in the future (as the targets are based on percentages and not absolute amounts) provided that these demand management measures are put in place. Annex II showcases the positive impact of demand management on the volumes of SAF required to decarbonise aviation.

Addressing aviation's non-CO_2 effects

Non-CO_2 effects (including persistent contrails as well as nitrogen oxide, water vapour and oxidised sulphur species emissions) count for over two-thirds of aviation's total climate impact. Despite the urgency of mitigating these effects, Fit for 55 has failed to include any measures to address them.

However, the ambition of ReFuelEU can be broadened to include addressing these effects. The EASA report on non-CO_2[6] explained that by reducing aromatics and sulphur in conventional fossil fuels, which can be achieved by a process called hydrotreating, these non-CO_2 effects can be reduced. Presently, there are no regulatory measures in place to reduce the levels of aromatics and sulphur in aviation fuel.

An effective measure would be to mandate that producers of fossil jet fuel, which will remain the bulk of jet fuel supply for some time, reduce these aromatic and sulphur levels. This is technically feasible and is similar to the sort of mandates which are placed on fuel suppliers for i.e. the road transport sector. It would also bring air quality benefits to areas around airports.

T&E recommends that: ReFuelEU Aviation requests the European Commission to publish an impact assessment study by 31 December 2023, outlining technical, economic, and legislative pathways to lower the aromatics, naphthalene, and sulphur content of fossil kerosene in order to mitigate contrail cirrus formation and improve air quality. ReFuelEU should also include a mandate for fuel suppliers to report annually to EASA the average aromatics, naphthalene, and sulphur contents of the aviation jet fuel supplied by them, and to make this data public. More information on T&E's specific recommendations on non-CO2 can be found here.

Supporting new aircraft

It is important that ReFuel EU adopts a holistic approach and supports the development of zero-emission (ZE) aircraft such as hydrogen and electric propulsion in the medium run. As such, fuel

[6] European Union Aviation Safety Agency (2020). *Updated analysis of the non-CO2 climate impacts of aviation and potential policy measures pursuant to EU Emissions Trading System Directive Article 30(4).* *https://www.easa.europa.eu/sites/default/files/dfu/201119_report_com_ep_council_updated_analysis_non_co2_climate_impacts_aviation.pdf*

suppliers should be encouraged to supply green hydrogen or enter into joint-ventures with zero-emission aircraft manufacturers. Such joint ventures should be recognised for compliance under ReFuelEU. Europe is already home to an increasing number of ZE aircraft start-up companies. It's important that Europe supports such initiatives, which can provide a sustainable growth opportunity for the EU's important aeronautical industry.

T&E recommends that: support for such aircraft can be achieved by including renewable hydrogen and renewable electricity in the scope of ReFuelEU. This requires that the definition of synthetic aviation fuels is amended to include renewable hydrogen and renewable electricity. The "drop-in" requirement for SAFs should also be removed from the definition.

Further information

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Annex I: Preferred ReFuelEU targets

in Mtoe and percentage of aviation fuel demand (2.2% compound growth rate)

Year	Total	Part A biofuels	Part B biofuels	Synthetic aviation fuels
2025	0.86 (1.7%)	0.14 (0.3%)	0.65 (1.3%)	0.051 (0.10%)
2030	3.00 (5.7%)	1.30 (2.5%)	0.65 (1.2%)	1.05 (2.0%)
2035	12.36 (22.6%)	4.50 (8.2%)	0.65 (1.2%)	7.21 (13.2%)
2040	28.91 (51.8%)	5.70 (10.2%)	0.65 (1.2%)	22.56 (40.4%)
2045	43.37 (77.3%)	5.84 (10.4%)	0.65 (1.2%)	36.88 (65.8%)
2050	56.88 (100.0%)	5.85 (10.3%)	0.65 (1.1%)	50.38 (88.6%)

Annex II: Positive impact of demand management on SAF volumes needed

In Mtoe and percentage of aviation fuel demand (demand management forecast)[7]

Year	Total	Part A biofuels	Part B biofuels	Synthetic aviation fuels
2025	0.86 (2.1%)	0.14 (0.3%)	0.65 (1.6%)	0.051 (0.12%)
2030	3.00 (7.8%)	1.30 (3.4%)	0.65 (1.7%)	1.05 (2.7%)
2035	9.27 (25.3%)	4.50 (12.3%)	0.65 (1.8%)	4.12 (11.3%)
2040	15.63 (45.1%)	5.70 (16.5%)	0.65 (1.9%)	9.28 (26.8%)
2045	21.68 (66.1%)	5.84 (17.8%)	0.65 (2.0%)	15.19 (46.3%)
2050	31.03 (100.0%)	5.85 (18.9%)	0.65 (2.1%)	24.53 (79.0%)

[7] This forecast assumes that fuel demand until 2050 does not exceed 50% of 2019 business travel demand and 100% of 2019 leisure travel demand