

【欧州】 【Common】

Common - EU decarbonization policy: The 4th European Aviation Environmental Report (EAER) 2025 recommends a wide range of supportive measures to promote sustainable aviation in Europe

Andrea Antolini Former Researcher JTTRI

【概要 : Summary】

Based on the 2050 climate neutrality target in the European Green Deal, the transport sector must reduce its GHG emissions by 90% by 2050, which also requires a reduction of emissions in aviation.

Since 2012, aviation in the European Economic Area is covered by the EU-ETS system. However, the aviation sector still accounts for 14.4% of the EU's transport sector's GHG emissions and the aviation sector's GHG emissions are still driven by increasing inefficiencies in the air traffic management system (ATM) across the EU and as air traffic has nearly returned to pre-pandemic levels.

Nevertheless, projections for air traffic growth have been revised, with expectations of reaching 11.8 million annual flights in the base traffic scenario by 2050. The challenge for a future reduction of aviation emissions will be to decouple air traffic growth from the sector's environmental impact.

The 4th European Aviation Environmental Report (EAER) 2025 provides a comprehensive analysis of the European aviation sector's environmental performance. It also evaluates the progress towards reaching the 2050 sustainability goals and offers strategies and recommendations for a

future sustainable aviation sector. The EAER 2025 report provides recommendations and suggestions regarding the establishment of a collective net zero carbon emissions goal from international aviation by 2050 at ICAO level.

Within the EU, as in-sector measures, the report recommends delivering on the ReFuelEU Aviation mandate, setting ambitious technology standards as well as initiating a European Fuel Standard project for optimizing the Sustainable Aviation Fuel (SAF) composition and implementation.

The report also recommends finally implementing the Single European Sky (SES) and ATM reforms, as well as mitigating non-CO₂ emissions in aviation at EU level.

By 2050, the technology, operations, and fuels related in-sector measures should have reduced CO₂ emissions by at least 65% in the EU27+EFTA, while the remaining gap to achieving net zero emission reduction should be bridged through out-of-sector initiatives like carbon offsetting programs.

If all these measures are implemented, a decoupling of air traffic from the sector's environmental impact could become an achievable target.

【記事 : Article】

1. Initiatives to reduce the EU's aviation sector's GHG emissions

The aviation sector accounts for 14.4% of the EU's transport sector's total GHG emissions and in 2022, flights departing from EU27+EFTA represented 4% of total GHG emissions in EU27+EFTA (Council of the EU 2024a, EASA 2025b). While the COVID-19 pandemic's impact only temporarily led to a decrease of GHG emissions from aviation, the increase in GHG emission levels is driven by inefficiencies within the air transport system, causing aircraft to operate on fuel-inefficient routes and congestion in the sky (European Commission n.d., EEA 2024a). While GHG emissions from power and industry installations in the EU saw the highest annual decrease of -16.5% and -24% respectively, in 2023 compared to 2022, verified GHG emissions from the aviation sector and aircraft operators increased by around 9.5% (European Commission 2024a, 2024b, EEA 2024b).

Since aviation also needs to make its fair contribution to achieving the Green Deal's 2050 climate neutrality and net-zero GHG emissions targets, the Commission is adopting and implementing legislation to strengthen the EU-ETS for aviation in 2024 and 2025 (COM (2019) 640 final). The EU is also implementing the ICAO (International Civil Aviation Organization)'s CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) global market-based measure to offset aviation emissions from extra-European flights of EU-based airlines (European Commission 2024a).

In the EU, the ReFuelEU Aviation Regulation (EU) 2023/2405 defines Sustainable Aviation Fuels (SAF) and mandates SAF blending, starting at 2% in 2025 and reaching 70% by 2050 (Regulation (EU) 2023/2405). In parallel, the share of synthetic aviation fuels will increase from 1.2% in 2030 to 35% in 2050 (Regulation (EU) 2023/2405). The use of SAF is expected to significantly reduce the GHG emissions of the aviation sector and SAF

can reduce CO₂ emissions by 80% compared to traditional jet fuel (Airbus 2024).

The ReFuelEU Aviation Regulation includes the task to introduce an Environmental Labelling Scheme to provide potential passengers with clear environmental performance information for flights (EASA 2024). All SAF supplied under the ReFuelEU Aviation mandate must comply with the sustainability and GHG emissions saving criteria as set out in the Renewable Energy Directive (RED) (Regulation (EU) 2023/2405, EASA 2025c). The ReFuelEU Aviation rules are expected to help cut CO₂ emissions by over 60% by 2050 compared to 1990 levels (Regulation (EU) 2023/2405).

Considering also non-CO₂ emissions, the overall climate impact of aviation is even higher than the effect of its CO₂ emissions alone, as non-CO₂ emissions account for 66% of the aviation sector's climate impact (European Commission 2024a). While aviation is strategically important for Europe, the sector must achieve its decarbonisation transition and deliver on agreed environmental goals, despite challenges such as delayed fleet renewal, high SAF price levels and related limited production capacity (EASA 2025b).

2. The EU aviation sector's main developments in environmental performance since 2022

The 4th edition of the European Aviation Environmental Report (EAER) 2025, released on 14 January 2025 by the Commission and European Aviation Safety Agency (EASA), with support from the European Environment Agency (EEA) and EUROCONTROL, provides an objective analysis of the EU's aviation sector's environmental performance and its progress towards achieving sustainability goals compared to the previous EAER 2022 report to keep the sector aligned with "the EU and international environmental targets" (DG Transport 2025, EASA 2025b).

Since the previous 2022 report, the EU's aviation sector has further recovered from the impact of the COVID-19 pandemic and the number of flights arriving at and departing from EU27+EFTA airports reached 8.35 million in 2023 (EASA 2025b). However, it is still 10% below the pre-COVID 2019 level. Furthermore, the Russian invasion of Ukraine in February 2022 shows its impact on the aviation sector as well as the conflict in the Middle East, leading to airspace restrictions and re-routings (EASA 2025b).

Against this backdrop, the 2025 EAER report analyses and highlights the key areas of progress since the EAER 2022 report (EASA 2025b).

From 2013 to 2023, the EU-ETS led to a net CO₂ emissions reduction in aviation of 206 Mt through funding of emissions reductions in other sectors, of which 47 Mt was in 2021-2023 (EASA 2025b). The EAER 2025 report finds that in 2023, flights departing from EU27+EFTA airports emitted 133 million tons CO₂, which was 10% less than in 2019 (EASA 2025b). The average mass of CO₂ emitted per passenger kilometre further decreased to 83 grams in 2023, equivalent to 3.3 litres of fuel per 100 passenger kilometres (EASA 2025b).

Key areas of progress include the adoption of ReFuelEU Aviation Regulation with a long-term SAF supply mandate increasing to 70% in 2050 and the creation of a Flight Emissions Label to provide potential passengers with clear environmental performance information for flights (Regulation (EU) 2023/2405). EASA is in the process of developing this Flight Emissions Label (see Antolini 2024a). This Label will align with the CountEmissions EU initiative on the accounting of GHG emissions of transport services and aims to enable citizens to make informed choices regarding the emission impact of flights (EASA n.d., COM(2023) 441 final).

Market-based measures like the EU-ETS for aviation are expected to help stabilize European aviation's net CO₂ emissions in the short term (EASA 2025b). Furthermore, the 2025 report

revises the future air traffic growth downwards compared to the previous outlook and concludes that this growth does not necessarily need to come at the expense of increased emissions as there have also been significant developments in the areas of SAFs and some improvements in air traffic management (ATM) (DG Transport 2025). However, the overall climate impact from aviation is a combination of both, its CO₂ and non-CO₂ emissions and there is evidence that non-CO₂ emissions have a higher environmental impact than CO₂ emissions, as non-CO₂ emissions account for 66% of aviation's total emissions (European Commission 2024a, Antolini 2024b). Therefore, the monitoring of non-CO₂ emissions from aviation in the EU, which started on 1 January 2025, based on the revised ETS Directive, is an essential step towards the introduction of future measures to reduce non-CO₂ emissions (European Commission 2024a, Antolini 2024c).

Furthermore, the report 2025 highlights the introduction of a ReFuelEU Aviation supply mandate for SAF in Europe and a sub-mandate for synthetic e-fuels as an important step to cut the net CO₂ emissions by at least 65 million tons (47%) in 2050 (EASA 2025b). However, as of 2024, SAF production represented only 0.53% of global jet fuel use, and SAFs are currently 3 to 10 times more expensive than conventional fuel (EASA 2025c). Therefore, a significant expansion of production capacity of SAF is required to meet future mandates and goals (EASA 2025c).

EU airports are supporting the uptake of SAF through investment in production, supply chain involvement, and airport infrastructure will need to be adapted to accommodate SAF. 118 airports in Europe have announced a net zero CO₂ emissions target by 2030 or earlier, of which 16 airports have already achieved it (EASA 2025b). Finally, the implementation of the Single European Sky (SES2+) and further ATM improvements are critical to enhancing aviation capacity, efficiency and sustainability in

Europe (EASA 2025b). According to the EAER 2025 report, 400 million tons of CO₂ emissions (9.3% less CO₂ per flight) could be saved by 2050 by completing the SES ATM Master Plan vision alone (EASA 2025b).

3. The EAER 2025 report's recommendations for a more sustainable aviation sector

The EAER 2025 report outlines strategies for sustainable aviation and recommends measures to reduce aviation's climate impact (EASA 2025b, DG Transport 2025). Compared to previous outlook, the EAER 2025 report revised future traffic growth downwards to 9.4, 11.8 and 13.8 million flights foreseen in 2050 under the low, base and high traffic scenario, respectively (EASA 2025b). As DG Transport (2025) points out, this growth does not necessarily need to come at the expense of increased emissions, if air traffic growth could be decoupled from the sector's environmental impact (DG Transport 2025).

Against this backdrop, key recommendations include increasing SAF use, optimizing ATM, as well as adopting more fuel-efficient technologies and the Clean Industrial Deal (DG Transport 2025, COM (2025) 85 final).

To deliver on the ReFuelEU Aviation mandate, the report recommends the establishment of supporting measures including a Renewable and Low-Carbon Fuels alliance, an EU Clearing House, and financial incentives (EASA 2025b). By implementing technology, operational improvements, and SAFs, the EU27+EFTA aviation sector could cut CO₂ emissions by at least 65% by 2050 (EASA 2025c). In line with ReFuelEU Aviation, the EAER 2025 report recommends to facilitating the access to and uptake of SAF through infrastructure investment and to reducing the SAF-fossil fuel price gap. Both fossil fuels and SAF fractions need to be optimised to mitigate overall climate and air quality impacts (e.g. fuel standards) (EASA 2025b). SAFs with the highest emission

reductions should be promoted to maximise their contribution to the European Green Deal as well as the ICAO LTAG and CAAF/3 objective (EASA 2025b).

Furthermore, the EAER 2025 recommends to strengthening oversight of environmental performance of the European aviation sector with a comprehensive monitoring system (EASA 2025b). It also recommends for introducing technology standards to incentivise innovation, including ambitious CO₂ and noise standards for new aircraft types and future designs, and to review existing NO_x emission standards for engines to drive innovation to achieving agreed sustainability goals (EASA 2025b).

Moreover, EAER recommends stepping up efforts to implement the SES2+ reform to modernising ATM and to enhance airspace efficiency and thereby to reduce delays and to lower emissions across the European aviation network (EASA 2025b).

EAER 2025 also recommends to implementing effective airport action plans to promote on-site renewable energy generation at airports, electrify ground operations, and to facilitate SAF adoption, among others (EASA 2025c).

Regarding the facilitation of research and implementation of solutions, the 2025 report recommends the increase of research resources and coordination at the EU and national level on strategic priorities across all areas (technology, operations, fuels) and to ensure the aviation sector is on the right path for the 2040 target including research on the climate effect of non-CO₂ emissions (EASA 2025b).

However, the projected growth in air traffic demand at European and global level demands still further action. The EAER recommends to addressing global challenges with global cooperation and to step up green diplomacy and technical collaboration with Partner States (EASA 2025b). EAER 2025 also recommends to introducing collective aspirational goals at ICAO level including net zero carbon emissions

from international aviation by 2050 and a reduction of CO₂ emissions from international aviation by 5% in 2030 with increased production of SAFs, among others (EASA 2025b).

Regarding market-based measures, they incentivise “in-sector” emissions reductions from technology, operational measures and SAFs, but also “out-of-sector” measures (EASA 2025c). EAER 2025 recommends to closing the remaining gap to achieve net zero emissions by 2050 through out-of-sector initiatives like financial mechanisms, the implementation of the EU Taxonomy System for aviation activities, and the support of the 2025 CORSIA Periodic Review, among others (DG Transport 2025, EASA 2025c).

4. Conclusion and considerations

Based on the findings of the EAER 2025, the European aviation sector faces sustainability challenges amid future air traffic growth, although 2025 report also revised the future air traffic growth projections downwards.

As DG Transport points out, this air traffic growth does not necessarily need to come at the expense of an increased GHG emission level, as there have been some improvements in the development and adoption of SAFs and in air traffic management, and more improvements are expected in future. However currently, challenges persist regarding the implementation of SAFs as production costs are still high compared to conventional kerosene and due to the limited availability of SAFs.

Therefore, the EAER 2025 report recommends focusing on the SAF adoption and the implementation of SAF infrastructure. More efforts need also to be put into SES reforms and ATM performance improvements. These in-sector measures are expected to optimize flight operations to further reduce GHG emissions in the European aviation sector. The remaining gap of achieving net zero emission reduction in aviation should be bridged through out-of-sector

initiatives by addressing the emissions outside the aviation sector itself, like in Carbon Offsetting Programs, the production and scaling of SAF production, or the increase of renewable electricity generation for airport operations, among others.

The sector must achieve its decarbonisation transition and deliver on agreed environmental goals despite challenges due to the delay of fleet renewal and high price levels of SAF together with limited production capacity.

By addressing and implementing the report’s recommendations, the European aviation sector should be able to progress toward achieving its environmental objectives, aligning with the goals of the European Green Deal and contributing to global sustainability efforts.

Therefore, DG Transport is optimistic that these EAER recommendations and related measures will make a decoupling of air traffic growth from the sector’s environmental impact achievable.

References

Airbus (2024): Sustainable aviation fuels. A new generation of reduced emissions fuels. In: <https://www.airbus.com/en/innovation/energy-transition/sustainable-aviation-fuels>, 2024, accessed 21 February 2025

Antolini, Andrea (2024a): Common - EU decarbonisation policy/Aviation - Utilisation of biofuel: Reducing Scope 3 emissions: The EU’s legislation, protocols for calculating GHG emissions of flights and EASA’s new Environmental Labelling Scheme. In: https://www.jttri.or.jp/topic_europe_2024Jul-02.pdf, 2024/08/07, accessed 6 March 2025

Antolini, Andrea (2024b): Common - EU decarbonization policy: 2024 EEA report on Trends and Projections and the Commission’s Climate Action Progress Report confirm slow GHG emission reduction progress in the EU’s transport sector. In:

https://www.jttri.or.jp/topic_europe_2024Dec-01.pdf, 2025/01/27, accessed 5 March 2025

Antolini, Andrea (2024c): Common - EU decarbonization policy: Monitoring, reporting, and verifying the non-CO₂ effects of aviation: The EU's new requirements for airlines to measure and report non-CO₂ emission effects from flights. In: https://www.jttri.or.jp/topic_europe_2024Oct-01.pdf, 2024/10/18, accessed 5 March 2025

COM (2019) 640 final: COMMUNICATION FROM THE COMMISSION. The European Green Deal. In: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN>, 11.12.2019, accessed 19 February 2025

COM(2023) 441 final: Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the accounting of greenhouse gas emissions of transport services, 2023/0266 (COD). In: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023PC0441>, Strasbourg, 11.7.2023, accessed 6 March 2025

COM(2025) 85 final: COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation. In: https://commission.europa.eu/document/download/9db1c5c8-9e82-467b-ab6a-905feeb4b6b0_en, COM(2025) 85 final, 26.2.2025, accessed 7 March 2025

Council of the EU (2024a): Single sky reform: Council adopts first reading position to improve efficiency of air space management in the EU. In: <https://www.consilium.europa.eu/en/press/press-releases/2024/09/26/single-sky-reform-council-adopts-first-reading-position-to-improve-efficiency-of-air-space-management-in-the-eu/>, 26 September 2024, accessed 19 Feb. 2025

DG Transport (Directorate-General for Mobility and Transport) (2025): European Aviation Environmental Report 2025 provides key

recommendations for a more sustainable future in aviation. In: https://transport.ec.europa.eu/news-events/news/european-aviation-environmental-report-2025-provides-key-recommendations-more-sustainable-future-2025-01-14_en, 14 January 2025, accessed 5 March 2025

Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652. In: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2413&qid=1699364355105>, OJ L, 2023/2413, 31.10.2023, accessed 19 February 2025

EASA (European Aviation Safety Agency, EASA) (n.d.): Environmental Labelling Scheme for Aviation. In: <https://www.easa.europa.eu/eco/aviation-environmental-label/topics/the-case-for-an-environmental-label-in-aviation>, no date, accessed 6 March 2025

EASA (European Aviation Safety Agency, EASA) (2024): EASA to inform air passengers on the environmental impact of their flight. In: <https://www.easa.europa.eu/en/newsroom-and-events/press-releases/easa-inform-air-passengers-environmental-impact-their-flight>, 25 Jan 2024, accessed 19 February 2025

EASA (European Aviation Safety Agency) (2025a): European Aviation Environmental Report 2025. In: <https://www.easa.europa.eu/en/domains/environment/eaer>, accessed 5 March 2025

EASA (European Aviation Safety Agency) (2025b): EUROPEAN AVIATION ENVIRONMENTAL REPORT 2025. Executive Summary and Recommendations. In: https://www.easa.europa.eu/sites/default/files/downloads/EASA_EAER_2025_BROCHURE_WEB_%CE%95%CE%9D_v2.pdf, accessed 5 March 2025

EASA (European Aviation Safety Agency) (2025c): European Aviation environmental report 2025. In: https://www.easa.europa.eu/sites/default/files/eaer-downloads/EASA_EAER_2025_Book_v5.pdf, 2025, accessed 6 March 2025

EEA (European Environment Agency) (2024a): Greenhouse gas emissions from transport in Europe. In: <https://www.eea.europa.eu/en/analysis/indicator/s/greenhouse-gas-emissions-from-transport>, 31 Oct 2024, accessed 19 February 2025

EEA (European Environment Agency) (2024b): Trends and Projections: EU greenhouse gas emissions see significant drop in 2023. In: <https://www.eea.europa.eu/en/newsroom/news/eea-trends-and-projections>, 31 Oct 2024, accessed 19 February 2025

European Commission (n. d.): Single European Sky. In: https://transport.ec.europa.eu/transport-modes/air/single-european-sky_en, no date, accessed 19 February 2025

European Commission (2024a): Climate Action Progress Report 2024. Leading the way: from plans to implementation for a green and competitive Europe. In: https://climate.ec.europa.eu/document/download/7bd19c68-b179-4f3f-af75-4e309ec0646f_en?filename=CAPR-report2024-web.pdf, 5 November 2024, accessed 20 February 2025

European Commission (2024b): Climate report shows the largest annual drop in EU greenhouse gas emissions for decades. In: https://commission.europa.eu/news/climate-report-shows-largest-annual-drop-eu-greenhouse-gas-emissions-decades-2024-11-05_en, 5 November 2024, accessed 20 February 2025

Regulation (EU) 2023/2405: Regulation (EU) 2023/2405 of the European Parliament and of the Council of 18 October 2023 on ensuring a level playing field for sustainable air transport (ReFuelEU Aviation). In: <https://eur-lex.europa.eu/legal->

[content/EN/TXT/?uri=CELEX%3A32023R2405](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R2405), OJ L, 2023/2405, 31.10.2023, accessed 6 March 2025