

# Investment scenario and roadmap for achieving aviation Green Deal objectives by 2050



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The European Green Deal targets carbon neutrality by 2050.

Overall, the transport sector is expected to contribute a 90 % reduction in emissions relative to 1990 levels; decarbonisation scenarios from the European Commission indicate that **emissions from European aviation are expected to be 89 % lower under the Green Deal.**

While emissions are expected to peak by 2025, **the majority of the reduction will come after 2030**, declining by 61 % from 2030 to 2050. Aviation is considered a difficult sector to decarbonise (due to substantial obstacles in electrifying aircraft) and will require measures on several fronts – technological, regulatory, financial.

## Main observations

### The study

assesses the cost to decarbonise aviation by 2050, the technologies to do so, and the European Union (EU) role in this process.

- Achieving reductions requires a multitude of technical measures, such as improvements in aircraft technology and operations, together with a significant uptake in the use of sustainable aviation fuels (SAF).
- New zero-carbon aircraft using hydrogen may be available for all market segments between 2030 and 2040, but this is too late to be the main means for decarbonising aviation.
- Significant investments of EUR 378 billion between 2020 and 2050 will be needed to replace aircraft

and introduce new technologies. This investment may deliver improvements in efficiency leading to lower operating costs for the industry, potentially balancing out the increase in fuel costs as a result of wider uptake of SAF.



- The EU supports this transition by funding research and development activities on aircraft and air traffic management (ATM) technologies, together with the deployment of digital and physical ATM infrastructure.
- The EU should continue to use funding and regulatory action to support increased production of SAF to achieve large scale cost reductions and technology maturity.
- Expanding the scope of the Taxonomy Regulation to include activities such as the sale or lease of more efficient/low-carbon emission aircraft, aircraft manufacturing and technology development aiming at/supporting decarbonisation, and production, storage and distribution of SAF, would attract green finance to the sector.

## Conclusions and policy recommendations

The EU has and will continue to have an important legislative role in strengthening the decarbonisation of aviation.



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Existing EU programmes have typically funded R&D for aircraft and ATM-related technologies, as well as deployment of the technologies. While these are key areas in the pathway to decarbonisation, an important share of future investments will need to cover the commercial availability of new fuels and purchase of more efficient aircraft.

The EU can **accelerate progress** in aviation decarbonisation by taking action in a number of fields:

- The EU should continue to pursue a **multifaceted approach** and act in all areas of aviation, including deployment of new aircraft technologies, market-based measures and wider use of SAF.
- The EU can continue to play a key role in **innovation** through ongoing support for R&D of new technologies for aircraft, ATM and SAF. Funding from the EU ETS for aviation and the proposed tax on kerosene could be earmarked for research in these areas.
- **Increasing the production of SAF and hydrogen** is crucial. Without large-scale production of sustainable fuels, it will be impossible to achieve the targeted emissions reductions. In its funding and regulatory capacity, the EU can play a role in this

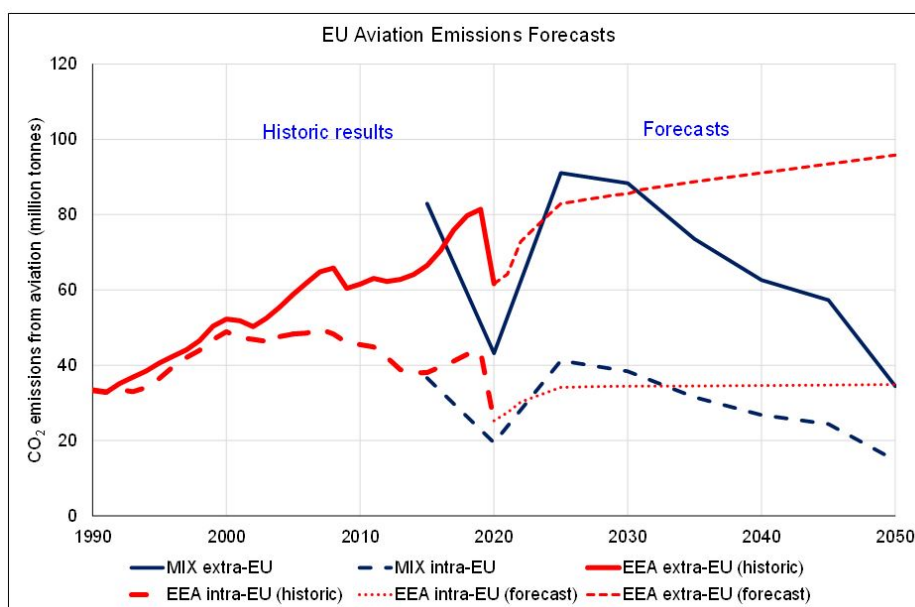
market to ensure that all types of SAF are produced in the necessary volume.

- EU action will be needed to certify SAF (in collaboration with other economic blocks), ensure that feedstocks are prioritised for aviation (and other sectors where decarbonisation depends on drop-in fuels), and **create the conditions for investment** in production capacity (and potentially support that production capacity directly).
- To incentivise investment in aviation decarbonisation, **the Taxonomy Regulation** should be expanded to include activities such as the sale or lease of more efficient/low-carbon emission aircraft, aircraft manufacturing and technology development, and production, storage and distribution of SAF.

The study considers a wide range of developing technologies to support the decarbonisation of the aviation sector:

- Aircraft technologies;
- Operational measures;
- Sustainable aviation fuels (SAF).

#### Comparisons of aviation emissions under the EU MIX scenario and the EEA forecasts



Source:

PRIMES/TREMOVE data ([MIX scenario](#)); EEA forecast: ([EEA, 2021](#)). Note: The EEA forecasts only extend to 2040; the chart includes extrapolations to 2050 by the authors

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