

-37% · -111 Mt

IMPROVEMENTS IN AIRCRAFT AND ENGINE TECHNOLOGIES

By 2050, improvements in aircraft and engine technologies and subsequent fleet replacement hold the largest promise for reducing aviation's contribution to climate change.



NET ZERO

We believe that together, policy-makers and the industry can make net zero CO₂ emissions a reality by 2050. In 2030, net CO₂ emissions from intra-European flights would be reduced by 55% compared to 1990 levels through a combination of fleet renewal, SAF, operational improvements and EU ETS/CORSIA, in line with the new EU climate goal for 2030.

To achieve net zero CO₂ aviation in Europe by 2050, while upholding international competitiveness and aviation's benefits to society – joint, coordinated and decisive industry and government efforts are required. **The time to act is now to make European aviation's climate ambitions for 2030 and 2050 a reality.**

Here is how improvements in aircraft and engine technologies can make a difference:



1 By 2035, aircraft with **highly efficient propulsion systems** and **30% less fuel consumption**, could become available.



2 Also by 2035, **hydrogen-powered aircraft suitable for short-range intra-European routes** have the potential to reduce CO₂ emissions by 100% as these aircraft progressively enter service.



3 Development of **more fuel-efficient aircraft**, engines and optimised range and capacity of **hybrid-electric rotorcraft** and regional aircraft would reduce CO₂ emissions per flight by 50% compared to 2018. These rotorcraft and regional aircraft should enter service between 2030 and 2035.



4 Both hydrogen-powered aircraft and hybrid-electric rotorcraft and regional aircraft **require dedicated technology readiness** by 2027 to 2030, at both aircraft and propulsion system level.



5 Following their readiness, **new technologies** should be swiftly incorporated in all commercial fixed and rotary wing products. This would require efficient new certification procedures for disruptive technologies.



6 Fleet renewal based on existing state-of-the-art products will continue to reduce CO₂ emissions, and even higher reductions could be achieved in the short term by **accelerated fleet renewal**.

-34% · -99 Mt

SUSTAINABLE AVIATION FUELS

Sustainable Aviation Fuels (SAFs) have major potential to reduce the aviation industry's climate impact. With SAF use, net CO₂ emissions over the lifecycle can be reduced by up to 80% now, and up to 100% in the future. Any SAF should follow robust and transparent sustainability criteria. Destination 2050 considers only advanced biofuels and synthetic fuels based on the EU Renewable Energy Directive as part of its roadmap.

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It is estimated that SAFs could account for up to 83% of the total fuel consumption in Europe by 2050.

Here is how the deployment of sustainable aviation fuels can make a difference:



- 1 Drop-in fuels can be **blended** with conventional kerosene and are certified at a 50% blend for use in existing fleets -- therefore foregoing the need for changes to the aircraft, engine or infrastructure. With engine and system adaptations, this could potentially rise to 100% SAF use in the future.



- 2 Scaling up and commercialising SAFs remains one of the key challenges. SAFs cost an estimated two to seven times the price of fossil fuels. A **long-term policy framework** is needed to de-risk investments and boost the production and uptake of SAFs. These measures include carbon pricing, investment incentives, and implementing an EU-wide blending obligation.

-8% · -22 Mt

SMART ECONOMIC MEASURES

Economic measures will initially represent the most promising option to rapidly reduce net emissions from European aviation. The goal is to assign a price to CO₂ emissions, ensuring that airlines and other operators take climate costs explicitly into account in their business decisions. Until SAFs and new aircraft become more widely used and breakthroughs such as hydrogen and hybrid-(electric) technology become available, smart economic measures are fundamental in reaching EU and global climate goals. The most effective measures are emissions trading and offsetting schemes.

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Here is how economic measures can make a difference:



1 Emissions trading schemes:

Through the European Emissions Trading System (EU ETS), the number of available emissions allowances is capped and reduced each year to ensure that the EU climate targets will be met.



2 Offsetting schemes:

Offsetting relies on purchases of carbon credits generated by projects that reduce emissions in other sectors. The ICAO Carbon Reduction and Offsetting Scheme (CORSIA) requires airlines to offset any emissions from international flights between participating States above the 2019 threshold. This global approach ensures maximum efficiency whilst ensuring that potential market distortion is minimised.

In 2050, carbon removal projects (e.g. Carbon Capture Storage, afforestation) will become economically effective as a way to balance any remaining emissions. Destination 2050 assumes that by 2050, any economic measure used by aviation will rely exclusively on carbon removals, enabling it to effectively reach net zero CO₂ emissions.

-6% · -18 Mt

IMPROVEMENTS IN AIR TRAFFIC MANAGEMENT AND AIRCRAFT OPERATIONS

Improvements in air traffic management (ATM) and aircraft operations can make an important contribution to reducing aviation's CO₂ emissions in the short to medium term, contributing to a 6% CO₂ reduction from European aviation by 2050. More eco-friendly operations are made possible thanks to a better collaboration between airlines, ANSPs, airports, pilots and air traffic controllers. Improvements are clustered in three areas: aircraft operations, air traffic management and ground operations at airports.

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Here is how improvements in ATM and aircraft operations can make a difference:



- 1 Improved flight planning, weight reduction and airframe condition and maintenance could reduce fuel burn, helped by innovative concepts such as **wake energy retrieval** (aircraft fly closer together than currently allowed).



- 2 The full implementation of the **Single European Sky** initiative is fundamental to remove barriers among Member States and streamline air traffic to guarantee passengers greater efficiency.



- 3 Reduced engine taxi, (electric) operational towing and reduced usage of Auxiliary Power Units (APU) at airports **could contribute to** more efficient ground operations while also reducing emissions of local air pollutants