Understanding Aviation's Environmental Impact

The aviation industry has played an important role in connecting the world with improving efficiency

Powering the global economy

~2%

Share of all human-induced CO_2 emissions

Around 80% of aviation CO_2 is emitted from flights over 1,500 km in length, where there is no viable alternative

50 years of innovation drives progress in the aviation industry

80%

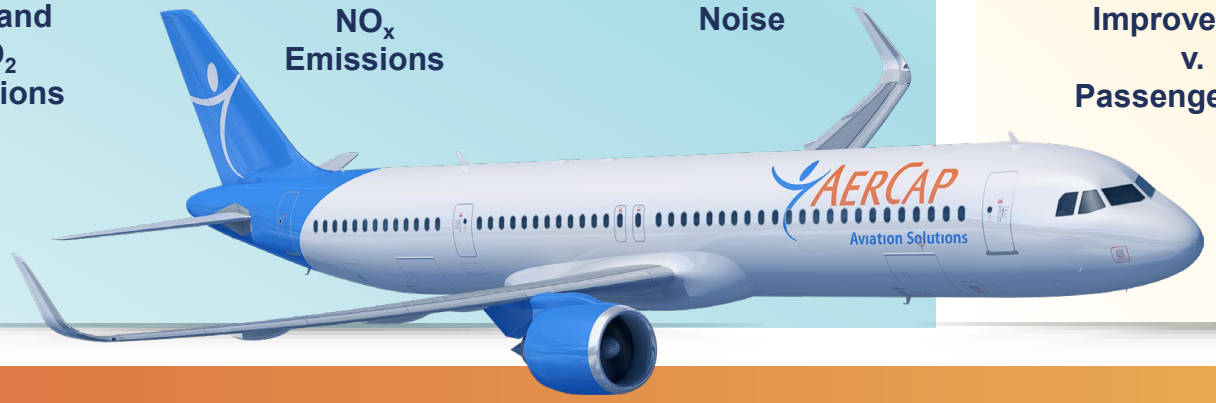
Fuel and CO_2 emissions

90%

NO_x Emissions

75%

Noise



Relative fuel efficiency improvement since 1990

3x

Improvement v. Passenger cars

9x

Improvement v. Heavy-duty trucks

ON AVERAGE, EACH NEW GENERATION OF AIRCRAFT IS ROUGHLY 15% TO 20% MORE FUEL-EFFICIENT THAN THE PREVIOUS GENERATION

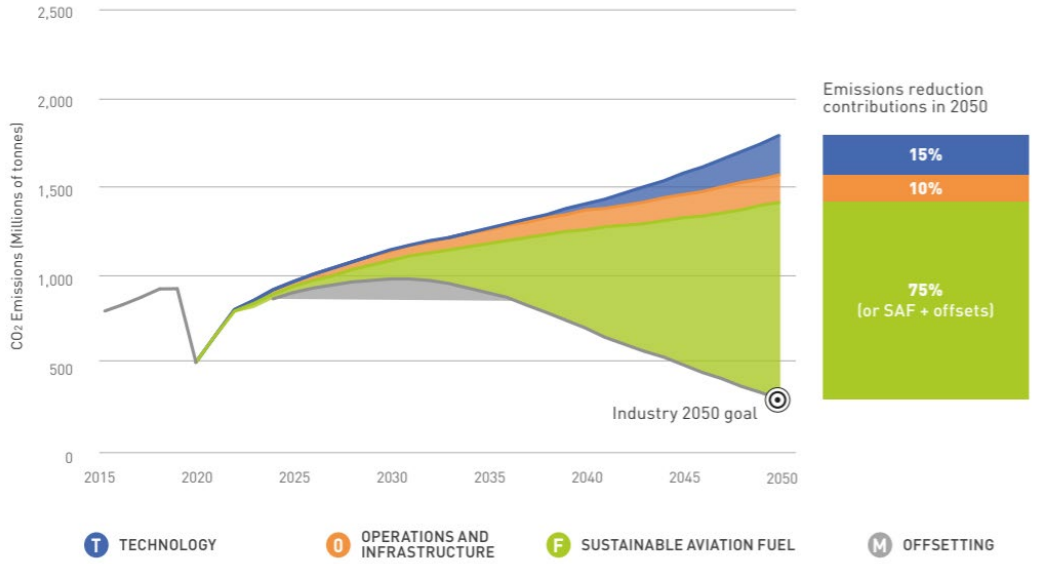
Source: Airbus, ATAG and IATA.

The Industry's Vision for 2050

In October 2021, IATA approved a resolution for the global air transport industry to achieve net zero carbon emissions by 2050 – the key question is: how will the industry get there?

- Net Zero is an ambitious but necessary goal for the aviation industry; as an industry we need to be part of the solution to climate change. Net Zero will not be achieved unless every player does its part; change must be the sum of collective effort
- There have been various scenarios suggested by industry bodies in relation to the path to Net Zero by 2050
- ATAG's Waypoint 2050 Report outlines 4 possible scenarios. We have outlined "Scenario 2: aggressive sustainable fuel deployment" here, which shows one potential roadmap to 2050, though it requires a significant improvement in the availability of Sustainable Aviation Fuel ("SAF")
- Market-based measures such as carbon offsets will also be needed to close the emissions gap to Net Zero, though the amount required will depend on the success of other efforts

Scenario 2: aggressive SAF deployment



This scenario assumes a 3.0% CAGR for traffic growth from 2019-2050[1]

Source: ATAG and IATA.
1. CAGR = Compound Annual Growth Rate.

Sustainable Aviation Fuel

SAF is a key pillar in the decarbonization of aviation, but it relies on production ramping up dramatically

- Emerging technologies such as hydrogen powered aircraft and eVTOLS may play some role in the decarbonization of the industry, but the long lead times needed to develop airworthy and viable solutions make a near-term impact on the emissions of the aviation industry unlikely
- AerCap believes that the most immediate way to make an impact and reduce the industry's carbon emissions today is to transition to new technology aircraft, coupled with the more widespread adoption of SAF
- SAF is a "drop-in" fuel that can be used in existing engines, currently up to a 50% limit, without the need for major overhauls or changes
- Depending on how it is made, SAF can reduce carbon emissions over the lifecycle of the fuel by up to 80% compared to the traditional jet fuel it replaces

Challenges

Lack of production | Cost (~2-8x more expensive) | Availability of feedstocks | Lack of government support and regulatory incentives | Engine investment to allow for >50% SAF usage

- It is estimated that SAF production needs to increase from ~100 million liters today to ~450 billion liters in 2050. IATA estimates that the investment required will be between $1 trillion and $1.4 trillion between now and 2050
- An increasing number of energy companies and airlines are making commitments to increase the production and use of SAF in their operations
- How will the industry get there?
  - Airlines: Investigate SAF opportunities through partnerships with other stakeholders, such as fuel suppliers and aircraft/engine manufacturers. Begin SAF-enabled test flights, set targets for SAF usage and outline plans to meet these targets
  - Governments: Clear policy support and incentives for SAF need to come into force, ideally by 2025, to provide certainty to the sector, to help catalyze further investment in new production facilities
  - Research Institutions: Continue to develop new pathways and partnerships to support new technologies for SAF production
  - Energy Industry: Bring all this together to ensure SAF's competitiveness with conventional fuel

Source: Airbus, ATAG, IATA and Climate Action 100+.