

Flying into the future

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While air travel is a significant contributor to global carbon emissions, the demand for budget and long-haul flights continues to grow. Can public and private investment into sustainable aviation technology help to reduce the industry’s carbon footprint?

Global efforts to achieve net zero targets are catalysing significant shifts in the transport sector, which is currently one of the biggest contributors to carbon dioxide (CO₂) emissions worldwide¹. To combat the growing climate crisis, decarbonising the way we travel is of the highest priority.

Typically heralded as one of the least eco-friendly methods of transportation, the future of the aviation industry dominates today’s sustainability conversations. Continued, collaborative investment is required if we are to find viable energy solutions to the challenges of air travel.

Air travel today

The aviation industry released approximately a billion tons of CO₂ into the atmosphere each year, before the COVID-19 pandemic. This accounts for approximately 3% of all CO₂². With reduced costs increasing air travel accessibility, these emissions are projected to triple by 2050 – a statistic which places the industry well behind any international net zero targets³.

Although interestingly, considering the sector’s reputation, aviation is only responsible for about 11% of global CO₂ emissions from transport – compared to road vehicles’ 74%⁴.



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Battery powered planes...

One alternative solution could be found in the further development of electric planes. Smaller all-electric planes with short journey times are already set to fly from as early as 2026. Some nations, such as Denmark and Sweden, plan to have all domestic flights fossil fuel free by 2030 and early adopters, such as United Airlines and EasyJet, are working with start-ups to develop battery-powered aircraft that run on electricity, as opposed to fossil-fuel derivative kerosene.

There are, however, some significant barriers to the rise of electricity-powered aircraft. One important obstacle is the current weight of batteries powerful enough to fuel a larger plane.

¹ ‘Electric planes are coming sooner than you think’, AFAR, 2022. <https://www.afar.com/magazine/electric-planes-are-coming-sooner-than-you-think>

² ‘Electric planes are coming sooner than you think’, AFAR, 2022. <https://www.afar.com/magazine/electric-planes-are-coming-sooner-than-you-think>

³ ‘Electric planes are coming sooner than you think’, AFAR, 2022. <https://www.afar.com/magazine/electric-planes-are-coming-sooner-than-you-think>

⁴ ‘Cars, planes, trains: where do CO₂ emissions from transport come from?’, Our World in Data, 2020. <https://ourworldindata.org/co2-emissions-from-transport>.

Petroleum-based jet fuel is energy dense. Comparably, the power-to-weight ratio of today's batteries means that for larger planes, the battery would need to weigh around three times more than the aircraft itself.⁵

As 95% of aviation's carbon footprint is a result of larger passenger flights, without significant investment to spur battery breakthroughs, electricity-only options cannot make a significant impact on the industry's overall emissions⁶.

Hydrogen fuel or biofuel?

Hybrid engines offer another method of reducing aviation's carbon emissions. By combining electric batteries with either traditional jet fuel engines, hydrogen fuel cells, or biofuel options, powering longer haul flights could be possible – and would still offer a worthwhile reduction in emissions. Although, further funding into developing these sustainable aviation fuels (SAF) will prove necessary to the success of hybrid engines. Schemes such as the UK's 'Green Fuels, Green Skies' programme launched in 2021 are examples of governmental investment into the SAF space.

If taken from sources such as used cooking oil or animal fats, biofuel can provide a sustainable source of energy. Biofuel is produced over a drastically shorter period of time than any fossil fuels and emits recycled CO₂ into the atmosphere. It is greener, and somewhat more renewable – although not entirely clean.

Currently biofuel makes up just 6% of global jet fuel, although with public investment, this could rise to as much as 80% by 2030⁷. However, issues such as the use of palm oil, and the displacement of food production remain.

Alternatively, hydrogen is being hailed as the solution to many energy problems worldwide, and hydrogen fuel could prove vital to the future of air travel. Green hydrogen can store energy at a high density but at an incredibly low weight, due to its elemental makeup. However, green hydrogen remains expensive, and there are some inefficiencies and safety concerns which still await resolution. Again, investment into the space could significantly reduce the price, making access to green hydrogen more ubiquitous.

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Looking to the future

Passengers are seeking sustainable travel options, and through improved on-the-go entertainment and remote working options, may also be increasingly happy to choose slower modes of transport – or even travel less frequently.

While alternative energy options could provide a solution to the aviation industry's carbon emission challenges, there is still a way to go before we can expect environmentally friendly air travel to become commonplace. Both national governments and private business have a role to play in funding this development. However, overarching barriers to investment in green mobility, including the steep cost of technology and the relatively high-risk space, leaves the aviation industry in need of collaborative support.



⁵ 'Electric planes are coming sooner than you think', AFAR, 2022. <https://www.afar.com/magazine/electric-planes-are-coming-sooner-than-you-think>

⁶ 'Electric planes are coming sooner than you think', AFAR, 2022. <https://www.afar.com/magazine/electric-planes-are-coming-sooner-than-you-think>

⁷ 'Will a British bioelectric plane really take off?', The Guardian, 2021. <https://www.theguardian.com/environment/2021/mar/18/will-a-british-bioelectric-hybrid-plane-really-take-off>



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