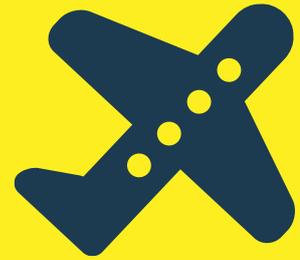


jet, set, go
the case for
electric-only UK
private jet flights
from 2025



november 2019

about

fellow travellers

Fellow Travellers is a not-for-profit, unincorporated association campaigning for fair and equitable solutions to the growing environmental damage caused by air travel. We aim to protect access to reasonable levels of flying for the less well-off, whilst maintaining aviation emissions within safe limits for the climate.

www.fellowtravellers.org

Twitter @a_free_ride

common wealth

Common Wealth designs ownership models for the democratic economy.

www.common-wealth.co.uk

Twitter @Cmmonwealth

This paper was first published in November 2019.

See accompanying Technical Report:

UK Business Aviation Market Analysis

for further info.

about the authors

Jamie Beevor is Technical Director at Green Gumption.

Twitter: @thatsamoray

Web: greengumption.co.uk

Leo Murray is the founder of the Free Ride campaign and a Director at climate change charity Possible.

Twitter: @crisortunity

Design by **mono.wales**

permission to share

This document is published under a creative commons licence:

Attribution-NonCommercial-NoDerivs 2.0 UK

<http://creativecommons.org/licenses/by-nc-nd/2.0/uk/>



executive summary

There were 128,000 private jet flights between UK and European airports in 2018, representing 6% of total UK air traffic, with a further 14,000 flights to destinations outside Europe.

The most popular UK private jet travel routes are domestic (within the UK)

We estimate the total warming impact of private jet operations to and from the UK to be $\sim 1\text{MtCO}_2\text{e}$.

We estimate that on average a typical private jet passenger journey within Europe emits around seven times as much greenhouse gases as the same journey made in business class on a typical airliner, around ten times as much as an economy class flight - and ~ 150 times as much as an equivalent journey made by high speed rail.

Industry estimates suggest $\sim 40\%$ of private jet movements are 'empty leg' journeys, in which empty aircraft are 'repositioned' for customer convenience.

The aviation industry and government ministers hype the potential for electric flight to decarbonise air travel¹, but our own analysis indicates this potential is limited to a technical maximum of $\sim 15\%$ of UK aviation emissions by 2050².

Our assessment is that the most substantial aviation market segment that is amenable to rapid electrification is the 'business aviation' sector - aka private jets.

Our new market analysis finds that as many as four out of five private jet journeys within Europe today are over distances that could in theory be completed by small fully electric aircraft currently in commercial development for market entry by the mid 2020s.

Because the user base for private jets has access to vast reserves of private capital, we suggest that a near term deadline for prohibiting fossil powered private jets from using UK airports could serve to accelerate R&D time-to-market horizons in the electricaerospace sector.

This would present important economic opportunities and help cement UK industry leadership in electric flight.

We contend that fossil fueled private jets represent the nadir of carbon inequality and their persistent use in the context of the escalating climate crisis can no longer be justified, particularly in light of the social effects of these flights.

Therefore we propose a near-total ban on fossil fuel powered private aircraft using UK airports from 2025 onwards.



A decorative graphic consisting of several yellow airplane icons flying upwards and to the right, each on a thin yellow diagonal line. The lines and icons are scattered across the page, with a higher density in the upper right and lower right areas.

private jets and the climate crisis

The focus of the 2019 World Economic Forum in Davos, Switzerland, was firmly on the escalating environmental crises facing humanity. But it is difficult to credit such discussions at these elite fora with sincerity when so many of the participants are arriving by the most polluting form of transport available: the private jet. It is estimated that over 600 private jets ferried the world's rich and powerful to and from Davos³, calling into question whether such gatherings are helping or hindering the fight against climate breakdown. Prominent elite voices calling for action on the climate crisis, such as Leonardo Di Caprio and Prince Harry, find their messages fatally undermined by the huge personal carbon footprints resulting from their routine use of private jets. Such figures present an open goal to reactionary media outlets pursuing an agenda to discredit and delay climate-positive social and political change.

By contrast, teenage Swedish climate activist Greta Thunberg's various journeys to high profile speaking engagements around Europe by train and to the United States by sailboat align clearly with her climate action message. Consequently this message has an unparalleled credibility, helping to propel both the meteoric rise of the global youth climate strike movement, and the "flygskam" phenomenon in her native Sweden - credited with a precipitous 15% year-on-year drop in domestic flights⁴. Swiss bank UBS has now begun warning investors that this trend could halve projected growth in aviation passenger demand over the coming decade⁵.

Elite cues are uniquely powerful in shaping social norms, so popular perceptions of celebrities, business leaders and politicians' actions in the context of the climate crisis play a key role in informing a common sense understanding of the appropriate societal response to this crisis⁶. People are predisposed to give

greenhouse gas emissions per journey

far more social weight to others' actions than to their words - a valuable heuristic as actions are a much more reliable guide to what people really believe than the rhetoric they use. As such, persistent use of fossil powered private jets by the world's highly visible elite acts as a drag on the wider shift to more climate-friendly social norms. But urgent action to avert climate catastrophe depends on different social norms emerging in order to manifest as rapid systemic change to decarbonise the economy⁷.

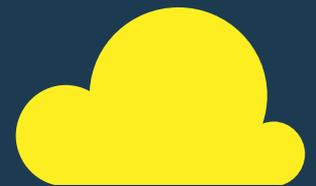
UK airports handled 128,000 private jets operating between Europe and the UK in 2018, equal to around 6% of all UK air traffic. Industry estimates suggest that on average, each of these flights carried fewer than five passengers. Our own analysis indicates that a typical private jet passenger journey within Europe emits around seven times as much greenhouse gases as the same journey made in business class on a typical airliner, around ten times as much as an economy class flight - and ~150 times as much as an equivalent journey made by high speed rail. Factoring in the extraordinarily high proportion of 'empty leg' journeys - ghost flights with no passengers aboard, in which aircraft are 'repositioned' for the convenience of customers - would mean increasing these emissions factors by more than 50%.

Total warming impacts from private jet flights from UK airports amount to around one million tonnes of CO₂ equivalent each year. Like demand for civil aviation overall, private jet flights, and the greenhouse gas emissions associated with them, continue to rise inexorably. Clearly this trend cannot be allowed to continue against a backdrop in which every other sector of the UK economy is required to decarbonise as quickly as possible.

Change may not come easily. Sir Elton John sought to counter accusations of hypocrisy levelled at Prince Harry and Meghan over their use of his private jet in summer 2019 by insisting this mode of transport is essential for their personal security. Similar claims are made by Silicon Valley executives for their own carbon profligate transport patterns. Apple's chief executive Tim Cook racked up nearly \$300,000 worth of private jet travel last year; Facebook recorded \$5m in private jet spend by Mark Zuckerberg over the past three years; while Google reimbursed former chairman and chief executive Eric Schmidt \$1.2m last year for its executives' use of his two planes for "business related travel"⁸. Evidently the world's richest people are very attached to private jet travel.



private jet journey



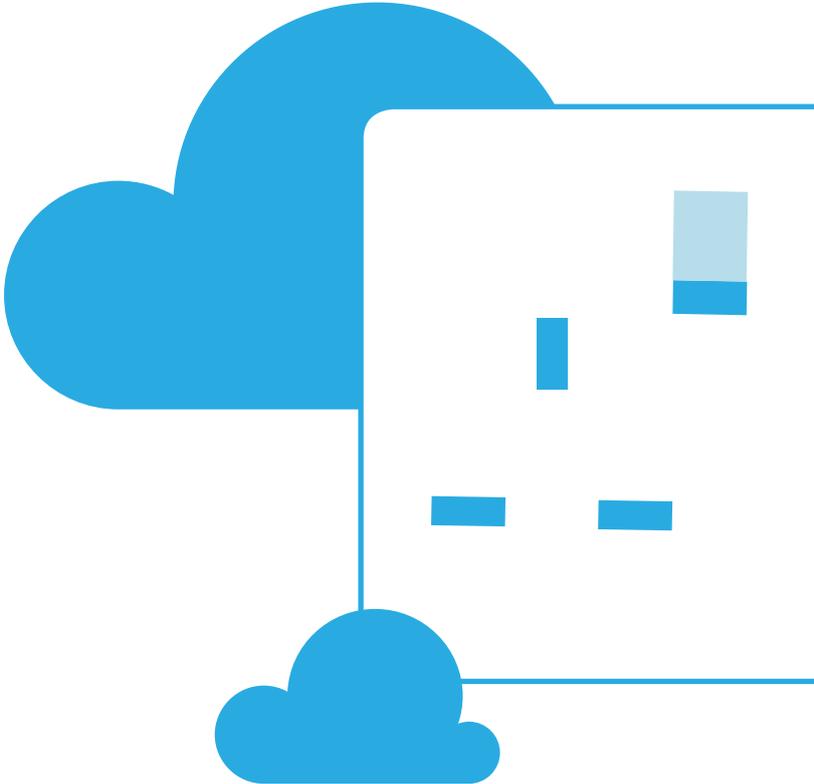
business class flight
x7 less



economy flight
x10 less



high speed rail
x150 less



electric dreams?

Meanwhile, the aviation industry's latest technological fix for the environmental damage they cause is focused on electric flight. Their techno-optimism is shared by the UK government. One of Grant Shapps' first speeches as Transport Secretary celebrated a projected 50% increase in passenger numbers over the period to 2050 (their target date for net-zero emissions), but suggested that investment in electric flight will be sufficient to mitigate the accompanying increase in emissions⁹.

Close scrutiny reveals this to be wishful thinking. Our 2018 market analysis found that the technical potential for electric flight to decarbonise UK aviation is very limited. At best, fully electric planes may be able to substitute for flights responsible for around 15% of total UK aviation emissions by the year 2050¹⁰. This is because although most flights are short haul, most emissions come from long haul jet travel, and there is no prospect of an all-electric transatlantic airliner materialising in this timeframe.

We did however identify the Highlands and Islands as a promising, albeit niche, air travel market which could be readily electrified. This is because it is comprised exclusively of small craft, with few passengers, travelling short distances over terrain that is challenging to navigate for surface transport modes. The Scottish Government have since recognised this, and this summer announced a commitment to make the Highlands and Islands the "world's first net zero aviation region" by 2040¹¹. Regional carrier

LoganAir expects its first fully electric planes to enter service on short Orkney routes in 2021¹². In reality, Holyrood is following the lead of Norway and Sweden, both of which have already committed to electric-only short haul flights over the Scandinavian regions' mountains, forests and archipelagos by 2040¹³.

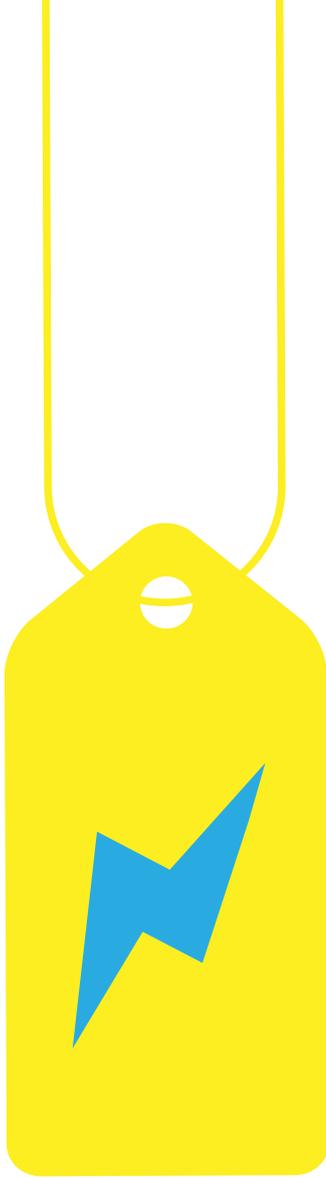
Although electric planes may be over-hyped in the decarbonisation stakes, it is clear that they have the potential to quickly decarbonise certain segments of the air travel market; namely, flights by small aircraft with few passengers travelling relatively short distances. However, the media hype around electric planes belies the low levels of investment in the research and development of such craft by the incumbent aerospace industry. The future of one of the most high-profile e-aviation start-ups, Zunum Aero, is now in doubt following the decision of aerospace giant Boeing not to provide further financial support.

Instead, most current electric aviation R&D projects are focused on developing e-VTOL craft¹⁴ - flying taxis. This focus on 'urban air mobility' (UAM) makes commercial sense for the aerospace sector, as flying taxis hold out the promise of expanding aviation's share of the overall travel market by offering rich city dwellers and suburbanites a new way to avoid traffic jams¹⁵. A 2018 report for NASA estimated that UAM could grow rapidly to a \$2.5 billion annual market in the US alone, eventually climbing to \$500bn¹⁶. But these craft will not, and are not intended to, decarbonise existing air travel, which is an entirely distinct market.

Nevertheless, by the mid 2020s the aerospace industry does expect to be offering into the market new, fully electric propulsion jets that are capable of carrying small numbers of passengers up to 1,000km. Our network analysis finds that these new models of electric plane would be capable of substituting for fossil powered craft on eight out of ten journeys within Europe that are currently made by private jet, and seven in ten of all UK private jet flights.

Therefore, we propose that the UK government should immediately set a hard deadline of 2025 for the phase out of hydrocarbon fuel propelled private jets at UK airports. Records indicate that around 1% of all business aviation is comprised of air ambulance flights, so dedicated medical aircraft should be exempt from the ban until craft are available that are capable of meeting all of their operational needs. Private jets are sometimes chartered to support disaster relief operations through the UN's Humanitarian Air Service¹⁷, and such missions should also be permitted to use UK airports.

the UK government should immediately set a hard deadline of 2025 for the phase out of hydrocarbon fuel propelled private jets at UK airports



the user base for private jets may represent the highest concentration of wealth of any group of consumers in the world

this is a good place to look to leverage private investment into rapid decarbonisation

electrify the rich

Nearly one in seven private jets in Europe is based in the UK. London is one of the financial centres of the world and almost half of all UK private jet traffic passes through just five airports around the capital. The global elite are accustomed to travelling to and from the UK in private jets on a routine basis. Although the sector is known as ‘business aviation’, this is a euphemism; data on journey purpose is not available, but seasonal spikes in traffic to popular holiday destinations suggest a large share of journeys by private jet are in fact for leisure. But the busiest private jet routes from UK airports are domestic flights to other locations within the UK.

We believe that an imminent ban on landing at UK airports in a fossil powered private jet would help to focus the minds of some of the wealthiest people on Earth on the urgent need to develop fully electric planes. Such a hard deadline could serve to bring forward the time-to-market horizons of electric aircraft manufacturers, by triggering an influx of private capital into aerospace research and development, at the same time as stimulating the nascent market for the supply of electric propulsion private jets.

Elton John reportedly has personal wealth of £320 million¹⁸. Prince Harry’s personal wealth is estimated at a mere £30m, give or take, but the Royal Family as a whole has a net worth of around £67 billion¹⁹. Sir James Dyson, the fifth richest man in Britain, is worth over £12 billion²⁰, and owns a £55 million private jet²¹. Fracking mogul Sir Jim Ratcliffe, Britain’s third richest man, is worth over £18 billion²² and owns four private jets and a helicopter²³. The user base for private jets may represent the highest concentration of wealth of any group of consumers in the world. This is a good place to look to leverage private investment into rapid decarbonisation.

Moreover, the corporate tech giants themselves are notorious for hoarding cash. Apple, with a little over \$100 billion in the bank, was overtaken as the world’s most cash-rich company this summer by Google’s parent company Alphabet, with \$117 billion. This unproductive capital could be helping to solve electric flight;

**a regulatory
countdown to
electrify private jets
will cement the UK's
aerospace sector's
pole position on the
industrial frontier of
zero carbon flight**

perhaps banning polluting private jets from Britain's airports could, via Silicon Valley's high flying executives, encourage some of it to do so. It is worth recalling that Parliament only agreed to pay for the construction of London's extraordinary Victorian sewer network after the Houses of Parliament themselves became uninhabitable due to the effluent polluting the Thames. Elites have a history of quickly finding answers to persistent, expensive-to-solve problems when they find themselves personally affected.

The UK government's Future Flight Challenge is currently offering £125 million of public money to "power a new generation of flying taxis, drones delivering goods and services and small, all-electric aircraft."²⁴ It is hoping this will be matched by £175m in private investment. Under the present circumstances we expect most of this investment to go into UAM; wealthy consumers do not enjoy sitting in traffic jams and will pay not to have to. But so long as they can keep landing their private jets with impunity, there will be no pressing market imperative to electrify them.

A regulatory countdown to electrify private jets will cement the UK's aerospace sector's pole position on the industrial frontier of zero carbon flight, at the same time as bringing this nascent market much more quickly into the present. Rolls Royce is already the second largest commercial aircraft engine manufacturer in the world by market share. This summer Rolls Royce announced it is acquiring Siemen's entire eAircraft division and all of its electric propulsion activities, their Chief Technology Officer stating that, "we believe that pure electric, or all-electric, propulsion will power smaller aircraft in the foreseeable future"²⁵.

Permitting only all-electric private jets to use Britain's airports from 2025 would also serve, in its own way, as an effective climate emergency "symbolic policy": a policy with a tangible impact that also raises the political profile of climate action²⁶. A 2025 ban on polluting private jets would signal an urgency that has been lacking in climate policy timelines, and convey a clear political message about the shape of the zero carbon transition too: that the up front costs will be borne first and foremost by those who can most afford to pay them.

This policy proposal and the analysis herein is underpinned by our full Technical Report, UK Business Aviation Market Analysis: Potential for Electrification, available at www.afreeride.org/wonkery



fellow
travellers



COMMON
WEALTH

endnotes

- 1 <https://www.gov.uk/government/speeches/an-electric-revolution-in-the-skies>
- 2 <https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/Electric+Dreams.pdf>
- 3 <https://www.weforum.org/agenda/2019/01/2019-sees-20-fall-in-private-jets-flying-to-davos/>
- 4 <https://www.bbc.com/worklife/article/20190718-flygskam>
- 5 <https://www.bbc.co.uk/news/business-49890057>
- 6 Westlake, Steve, A Counter-Narrative to Carbon Supremacy: Do Leaders Who Give Up Flying Because of Climate Change Influence the Attitudes and Behaviour of Others? (October 2, 2017). Available at SSRN: <https://ssrn.com/abstract=3283157> or <http://dx.doi.org/10.2139/ssrn.3283157>
- 7 Gossling, Stefan, Celebrities, air travel, and social norms (Nov 2019) <https://doi.org/10.1016/j.annals.2019.102775>
- 8 <https://www.ft.com/content/5c1d99f0-e3dc-11e9-b112-9624ec9edc59>
- 9 <https://www.gov.uk/government/speeches/an-electric-revolution-in-the-skies>
- 10 <https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/Electric+Dreams.pdf>
- 11 <https://www.pressandjournal.co.uk/fp/news/politics/holyrood/1833622/nicola-sturgeon-unveils-plan-to-create-emission-free-airways-over-the-highlands-and-islands/>
- 12 <https://www.thetimes.co.uk/article/electric-planes-will-connect-highlands-and-islands-w6ckvcw8w>
- 13 <https://www.bbc.co.uk/news/business-48630656>
- 14 <https://www.flightglobal.com/news/articles/electric-aircraft-projects-to-top-200-by-year-end-r-458135/>
- 15 <https://medium.com/radical-urbanist/ubers-200-helicopter-ride-is-a-preview-of-its-pricey-flying-cars-b95d570403c9>
- 16 <https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20190001472.pdf>
- 17 <https://www.wfp.org/unhas>
- 18 <https://www.thetimes.co.uk/article/sunday-times-rich-list-elton-john-net-worth-69mlqh9pn>
- 19 <https://brandfinance.com/news/press-releases/valued-at-67-billion-the-monarchy-is-britains-greatest-treasure/>
- 20 <https://uk.finance.yahoo.com/news/the-richest-people-in-britain-064910875.html>
- 21 <https://www.private-jet-fan.com/james-dyson-jet.html>
- 22 <https://uk.finance.yahoo.com/news/the-richest-people-in-britain-064910875.html>
- 23 <https://www.lovemoney.com/gallerylist/76215/sir-jim-ratcliffe-his-journey-from-council-house-to-britains-richest-man>
- 24 <https://www.gov.uk/government/news/developing-the-future-of-flight-take-part-in-the-challenge>
- 25 <https://www.rolls-royce.com/media/press-releases/2019/18-06-2019-rr-accelerates-electrification-strategy.aspx>
- 26 <https://theconversation.com/five-things-every-government-needs-to-do-right-now-to-tackle-the-climate-emergency-123344>