

## The flying less movement

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Auteur(s) (texte brut)

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Chapô

Compared to the cacophony of disparate voices praising the virtues of driving less, cycling and walking, calls for rethinking habits have until recently been few and far between. Yet the number of advocates of ‘flying less’ has been steadily growing over the decade. As their voices begin to echo further afield, they have turned what was until recently a rather niche debate into a mainstream one, reshaping the way we think of air travel. Who are these people and what is their message?

Présentation longue

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The flying less movement has been energised by citizens making a consistent effort to achieve a low-carbon footprint through, for example, recycling, using more energy-efficient appliances, or driving less, but also in activities away from home often involved flying such as holidaymaking and work-related conferences and meetings. Although the size of the movement it involves a growing number of people from many different professional backgrounds in every continent. Some of its most visible advocates are environmentalist Rob Hopkins, founder of the Transition Towns movement, Swedish sports commentator and Olympic Olympian Bjorn Ferry, Swedish opera singer Malena Ernman and her daughter Greta Thunberg, Maja Rosén and Lotta Rosén of We Stay Grounded, and climate scientists such as Alice Larkin and Kevin Anderson in the UK, Peter Kalmus and Kevin Anderson in the USA.

Key strands of their message, as articulated by some of its most visible figures, can be succinctly outlined in the following:

### Climate change is an urgent issue

We tend to think of climate change as a problem that can be addressed with incremental changes in technology and behaviour leading to lower energy consumption in a more or less distant future. Yet, what matters are not levels of technological efficiency but the cumulative greenhouse emissions which could trigger a tipping point in climate dynamics. This means that we have a ‘carbon budget’ that must be adhered to if average global temperatures are to stay below what has been agreed as being a safe level. The size of this budget depends on the probability of exceeding the 1.5 or 2 degrees threshold between acceptable and dangerous climate change<sup>[2]</sup>. To meet the commitment of the Paris Agreement of keeping temperatures ‘well below 2 degrees’ (and aiming for 1.5 degrees) we have a carbon budget of 655 billion tonnes of CO<sub>2</sub> (from 2020), and at the current rate of emissions this budget will be consumed within 18 years. If rich countries are to honour the principle of equity enshrined in the Paris Agreement and make a serious mitigation effort, they have to cut carbon emissions by more than 10% per year<sup>[3]</sup>. The problem is that adapting even to new energy systems can take decades, and therefore there is no alternative but to reduce energy demand<sup>[4]</sup>. This means changing lifestyles<sup>[5]</sup>, and for those who have normalised high-carbon lifestyles this means flying less or not flying at all<sup>[6]</sup>.

### Climate change is about equity

The notion of carbon budgets reframes climate change as a zero-sum game. The more carbon is emitted by some, the less is left for others. Discussions about the responsibility for reducing emissions have tended to focus on emissions by countries. Turn of the century individuals, recent reports by Oxfam<sup>[7]</sup> and the French economists Lucas Chancel and Thomas Piketty have shown that the richest 1% of the global population is responsible for 50% of carbon emissions<sup>[8]</sup>. Climate scientist Kevin Anderson has estimated that if a privileged group were to reduce its emissions to those of the average European citizen, global carbon emissions would

within one or two years<sup>[9]</sup>. Poor people who will be most affected by climate change are those who emit less carbon being could be significantly improved with a transition to more sustainable energy consumption. The main problem is that there are some who are eating most of it while others pick at the crumbs that fall from the table. <br></br>

## Flying is not normal

In western societies affluent segments of the population have come to think of flying as a normal aspect of everyday life, a normal aspect of holidaymaking and certain jobs such as academic research. Yet, only 2-3% of the world's population fly in any given year and 95%<sup>[10]</sup> have never been on a plane<sup>[11]</sup>. Seen from a global perspective, flying is an elite form of transport. In some western societies, flying is the privilege of a few. In the UK 15% of the population is responsible for 70% of a <br></br> [[{"type":"media","fid":"3864","attributes":{"typeof":"foaf:Image","width":"1136","height":"1136"},"view

Graphic 1. Most flights abroad in England are taken by a small, affluent part of the population. Credit afreeride.org <br></br>

## Flying is artificially cheap

Worldwide more than 420 new airports, 121 new runways, 205 runway extensions, 262 new terminals and 175 terminals are currently being planned or under construction<sup>[13]</sup>. The aviation industry expects the number of passengers to double by 2037<sup>[14]</sup>. But this growth is being aided by low-tax or tax-free fuels<sup>[15]</sup> and a lack of regulation regarding carbon emissions. It has repeatedly been left outside international climate negotiations such as COP21 and current plans to offset aviation emissions have fundamental flaws<sup>[16]</sup>. The current system of mass air travel relies on a number of policies and those policies can be changed. The expansion of aviation is not inevitable. <br></br>

## Beware of techno-optimism...

Despite claims by the aviation industry such rapid growth is not 'green'<sup>[18]</sup>. There is no such thing as sustainable aviation. Fuel efficiency and less polluting fuels are not enough to make aviation a clean mode of transport, especially considering the expected rapid growth in demand<sup>[19]</sup>. Norway's airport operator has noted that electric planes will be available by 2020 for short haul flights<sup>[20]</sup>. There are at least four problems with this statement. Firstly, it still has to be proved that large commercial aircraft will be available by then and that they will deliver what is being promised today<sup>[21]</sup>. It is important to remember that the development of new technologies often go through a hype phase in which the technical problems are consciously downplayed and potentials are overstated so as to attract investment. Secondly, even if commercial electric planes could work for short haul flights, which in the UK accounts for around 72% of aviation emissions, would still operate with conventional fuels regardless of whether electric planes are available then, the key concern is to reduce emissions as fast and as widely as possible in the next two decades so as to have a fair chance of avoiding dangerous climate change. Right now, the only way to reduce emissions significantly in aviation is by reducing demand. Finally, aviation will consume a very large part of the carbon budget by 2050. In a 2015 report, the research organisation Öko-Institut warned the European Parliament that international aviation's CO2 emissions will be a share of 22% of global emissions by 2050. This share is greater in countries where aviation is more prominent. Projections for the United Kingdom show that if the government is committed to limiting global warming to 1.5 degrees 71% of the national emissions will be consumed by aviation by 2050<sup>[24]</sup>. It is possible that other forms of commercially viable air travel such as air ships will be developed to make low-carbon aviation possible<sup>[25]</sup>. Investment is being put into this possibility, but for now avoiding dangerous climate change means reducing aviation demand and changing one's lifestyle accordingly<sup>[26]</sup>. <br></br>

## ... and don't sweeten the message

The need to address climate change has been discussed for three decades. During this time messages of hope have been spread and achieved very little: green-house emissions keep growing. Reporting clearly and bluntly about the serious risks ahead is more important than spinning a cheerful yarn about climate change as recent research suggests<sup>[27]</sup>. <br></br>

## Integrity matters

When communicating science, it is important to ‘walk the talk’<sup>[^28]</sup>. If science says that current trends in aviation are avoiding danger – but to do so requires change, then it makes sense to act accordingly, otherwise one’s talk may be undermined by virtue signalling. Lecturing people about the risks of climate change and its effects on the planet and poor people while will ultimately weaken trust in scientists<sup>[^29]</sup>. <br></br>

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Image 1. Climate activist Greta Thunberg on the train, leading by example. <br></br>

## Individual versus collective action is a false dichotomy

Reducing emissions urgently requires decisive action by governments and big business to put in place regulations and enable individuals to change their habits. However, the argument that a focus on individual action diverts attention from is premised on a false dichotomy. Individual action does matter because it is a catalyst for collective action. Four interrelated considerations consider: <br></br>

a) Never underestimate the power of small, peaceful minorities

Most probably only a small part of the population will willingly fly less or stop flying. But small minorities can be powerful; their gestures matter, especially when, as is often the case with frequent flyers, these people occupy influential positions and can be heard more loudly than others. The actions of a small but visible segment of the population could be a symbolic catalyst for wider cultural change. Weren’t the suffragette, abolitionist, and American civil rights movements initially a small number of individuals committed to positive change?

b) If you decide to fly less you are inspiring others

People fly less when others around them, especially influential figures, fly less or stop flying. Research by Steve Westgate shows that those who know such an individual, around half fly less as a result, and around three quarters say knowing that person changes their attitudes<sup>[^30]</sup>. When communicated effectively, the action of an individual sends ripples across the many social relationships in a part of – local communities, work places, professional associations, hobby and sports societies<sup>[^31]</sup>. The larger the number of settings where action is taken the more likely it is that opinion dynamics will be flipped. So if you decide to fly less, make sure you talk about it.

c) ... and you are creating space for ambitious policies

‘Political will’ is needed to achieve radical mitigation in all sectors of the economy. But politicians cannot lead without public consent. Research conducted from 2014 to 2018 by Rebecca Willis from Green Alliance on how climate change looks from the politician’s perspective found that most British politicians understood the need to act on climate but it was not straightforward for them to do so. Reasons included the fact that climate change was not yet something discussed as part of mainstream politics and talking about it was a ‘career-limiting move’. Another reason was that ‘politicians feel under very little pressure to act on climate change. They are under pressure from their constituents, and need to find ways to make climate action relevant to the daily lives and concerns of their electorate<sup>[^32]</sup>.’ Following the ‘climate spring’ of 2019 UK politicians now need to respond to higher levels of public concern. An insight from this research still is that if political will cannot exist without public consent, with your personal actions you can make ambitious policies possible. <br></br>

## In a nutshell

Atmospheric scientist Peter Kalmus summarises the argument: ‘Collective action enables individual action (by shifting cultural norms). Individual action enables collective action (by shifting cultural norms). Visible, conspicuous individual action is also a catalyst for collective action. You won’t get a carbon fee and dividend, for example, until the grassroots care enough about climate change<sup>[^33]</sup>.’ <br></br>

Flying probably dominates your emissions

In 2016 the European Union was 8.7 tonnes of carbon (measured in CO2-equivalent) per capita per year. This is a significant amount of carbon. In fact, it is an integral aspect of your lifestyle, one of the most effective things you can do to prevent climate breakdown is to fly less.

## Flying less is about living within planetary boundaries<sup>[36]</sup>

The annual emissions budget per person per year required by 2050 in order to stabilize warming below 2 degrees is 2.1 tonnes. If we are to stay below 1.5 degrees it is less than one tonne<sup>[37]</sup>. Since the world is decades away from viable clean flying technologies, flying less is a necessary step to live in a liveable planet<sup>[38]</sup>.

## Flying less is about positive change

Flying less is not about ‘sacrifice’ or limiting one’s choice. Instead it should be seen as making a positive change in our lives, a rediscovery of the pleasures of slow travel and simple living<sup>[39]</sup>. Above all it is a commitment to ‘live with the future’ and to care for the planet, the world, the future, the poor, the marginalized and as if we cared for our children, future generations and the poor.

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Image 2. Images of simple and fulfilling living from the Instagram account of Aarne Granlund, a sustainability researcher in Helsinki. Aarne enjoys fly fishing in waters near Helsinki or in Lapland where he travels using extremely low-carbon means of transport.

## Flying less is about exploring all available options

People who stop flying or begin flying less often talk about the pleasures of discovering that one’s lifestyle can be re-imagined. Flying less is not about giving up, it is about exploring all available options and that aviation is not as necessary as it may seem – even if you are a travel writer. Utterdahl has demonstrated<sup>[41]</sup>! Frequent flyers including many academics should take an opportunity to re-set their priorities, to ask themselves why they fly and whether it is strictly necessary<sup>[42]</sup>. Do I really need to attend that conference<sup>[43]</sup>? Why not an on-line conference? Would I attend it if it took place in a less attractive place? Am I really attending because of the benefits to my work or because of the tourism opportunities it provides? How much is flying related to status seeking in academia and other jobs? Isn’t it possible to stay updated about your research field by using the many on-line resources available? Is flying really unavoidable or is it a habit? Can I change my habits? Work places can help in promoting a new culture of doing business and research. For example, the Royal Society for Open Society has issued guidelines for helping their own staff to consider every non-flying option possible and for other institutions to be used by other institutions.

## Flying less does not mean giving up holidays abroad

Although long-distance travel by train and ship does not currently receive the same support as airport expansion, in Europe it is possible to travel comfortably by these means of transport. The flying less movement hopes that enough people will demand more carbon land and sea travel options so that eventually it becomes easier to visit distant places without jumping on a plane. For example, Kate Andrews, co-founder of Loco2<sup>[45]</sup>, a London-based start up whose mission is to make booking a train in Europe easier than booking a flight. Many people plan their railway journeys with the help of The Man in Seat 61<sup>[46]</sup>.

## A growing movement

Flying is so engrained in the lifestyles of more affluent segments that the possibility that sometime in the near future people will fly much less, may seem implausible. Yet recent developments suggest that what we regard as normal in travel can change. People are realizing that flying is not the only way to travel. In Sweden, the debate about flying has been taking place in mainstream media since January 2018 and is now a part of everyday conversations. Celebrities such as Olympian gold medallist and Sports TV presenter Björn Ferry and opera singer Cecilia Ernman, and ordinary citizens such as mothers Maja Rosén<sup>[47]</sup> and Lotta Hammar who launched the campaign Flygfrött 2019<sup>[48]</sup>, have played a key role in raising awareness. According to Agence France-Presse<sup>[49]</sup>, ‘in March 2019 the Wildlife Foundation published a survey indicating that nearly one in five Swedes had chosen to travel by rail rather than by plane’.

minimise their environmental impact<sup>[50]</sup>.' According to the same source, 'a survey published in Sweden's leading travel magazine, *Vagabond*, said 64 per cent of Brits whose first holiday abroad was last year did so because of climate reasons. A separate survey by the BBC Radio showed that the climate is the most important political topic for young people today. After a sustained growth in international airline passengers for almost ten years (from 31 million in 2009 to more than 39 million in 2018) growth of international air travel fell sharply in 2018 (from 9% to 4%) and there were fewer domestic and international charter flights than in the previous year. In the summer and the problems faced by local budget airlines have been noted as plausible causes, data for the first quarter of 2019 shows a continuation of trends registered in 2018 (378,000 fewer passengers with respect to the same period in the previous year and a 4.5% fall in demand<sup>[51]</sup>). It is being suggested that the new aviation tax<sup>[52]</sup> introduced in April 2018 as well as the growing awareness about aviation's impact on climate may also explain this trend.

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Image 3. Citizens in Sweden, United Kingdom, Denmark, Belgium, France, Germany and Canada are pledging to stay at home for a year. Credit Flight Free UK.

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The debate about flying less has spread to Finland. According to sustainability researcher Aarne Granlund<sup>[53]</sup>, the debate has gained momentum at the end of 2018 and is taking place in a wide range of contexts from youth organisations, the church and the education system, to some political parties, some large corporations and the sports world. A survey conducted in March 2019<sup>[54]</sup> found that 'out of five Finns consider that urgent action is needed to mitigate climate change' and a third of the population has calculated their carbon footprint. Interestingly, 'About 40% of the Finns have reduced flying because of climate reasons. About the same number of respondents intend to fly less within the next five years. A little less than half (45%) have travelled by air over the past year. A group called "Maata pitkin matkustavat", connecting people committed to ground travel, has organised its own flying lessons.

Signs of an incipient new culture of travel in Scandinavia are visible in the decisions of newspapers in Sweden and Denmark to change their travel sections to cover domestic and European destinations easily accessible by public transport. Sweden's third largest morning newspaper, Svenska Dagbladet, is halving the number of reports about destinations further than a five hour flight from the number of articles about destinations in the Nordic countries. According to Associated Press<sup>[55]</sup>, Politiken, 'one of the largest newspapers is ceasing domestic air travel and reducing international flights for assignments to a bare minimum. [...] The travel section will [now] cover...destinations easily reachable by public transportation.' In the midst of these developments, train travel is rising. According to Agence France-Presse<sup>[56]</sup>, passenger numbers at state train operator SJ reached a record 32 million in 2018, a 10 per cent boost in business travel during the 2018-2019 winter, and the government has announced plans to reintroduce night trains between European cities before the end of its mandate in 2022.' In 2018 Interrail ticket sales increased by 50%. 'Catherine Edwards, director of the 'Sweden made a commitment in its spring budget to invest 40 million kronor (3.8 million euros) on investigating alternative modes of transport to flying, including overnight trains to the continent<sup>[57]</sup>.

Elsewhere in Europe the number of articles in the mainstream media about climate and aviation has grown considerably in the last few months, following the publication of the IPCC report on 1.5 degrees and the exponential rise of the climate movement. See also the report for Climate and Extinction Rebellion.

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Image 4. The Times Weekend supplement from 1 June 2019 encouraging readers to enjoy low-carbon travel.

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Flying less policies are beginning to be discussed and / or adopted by a growing number of European academic institutions. These include Bristol University, Edinburgh University, Lancaster Environment Centre, UK Innovation Agency, the Met Office, the Centre for Sustainability Studies, ETH Zürich.

On the other side of the Atlantic, for the first time the Biennial Conference of Cultural Anthropology took place online to reduce travel-related carbon emissions and to facilitate a broader participation in the field of facing visible structural changes made for other big conferences to follow suit. Anthropologist Jason Hickel has called for an end of the annual meeting of the Anthropological Association (AAA)[^59] arguing that in an age of dangerous climate change, unnecessary flights cannot be justified and go against the professional ethics code of the AAA which states that ‘Anthropological researchers must do their utmost power to ensure that their research does not harm the safety of the people with whom they work.’ He calls on anthropologists to move forward and join others who are already working to create a low-carbon research culture: ‘We as anthropologists – we have the opportunity to lead on this front, just as we led on anti-racism and anti-colonialism in the past. We can set an example for other disciplines and professional associations will follow. Climate scientists are already taking this step. We should be right behind them. The ethical imperative is clear: it’s time to end the annual meetings in their present form and come up with a safe, just, and sustainable alternative. (...) I have no doubt that this shift would attract landslide support among anthropologists eager to help us reduce our carbon footprint. Let’s make it happen, starting in 2018. We have little time to lose.’

## Negotiating inertias in work and travel cultures and infrastructures

Obviously attempts to significantly reduce one’s carbon footprint face many constraints, as the guidelines to reduce carbon emissions issued by the Tyndall Centre acknowledge. These constraints range from expectations at work places to spend a limited amount of money and time travelling, to practicalities such as when travelling long distances with small children (for example, to visit relatives). Inertias of the system are there constraining individuals’ desires and aspirations for low-carbon travel. The flying less movement emphasizes on rethinking what is necessary and possible at a personal level within existing constraints, while at the same time supporting wider efforts for profound changes in working cultures and travel systems.

## Acknowledgements

Aarne Granlund kindly provided information about developments in Finland. The online #flyingless community is a place for debate and inspiration.

## Appendix

These are some resources to learn more about the flying less movement. Please note that the list is not exhaustive.

Video with Kevin Anderson on aviation and climate change.

Video about Peter Kalmus: find out how and why a climate scientist felt compelled to shrink his carbon footprint by 90%.

Video with Alice Larkin: Aviation, shipping and the Paris Agreement.

Atypical Lifestyle Choices: an exploratory workshop.

## Petitions to support a low-carbon academic culture

International: Flying less: Reducing academia’s carbon footprint

Denmark: An open letter to Danish universities: Let us show the way towards a more ambitious climate agenda

## Initiatives to reduce aviation

We Stay on the Ground

Flight Free UK

A Free Ride: Campaign for a fairer way to fly

No Fly Climate Sci

Flying less: Reducing academia's carbon footprint

[<img alt="forumviesmobiles.org logo" data-bbox="115 20 185 40"/> <a href="https://fr.forumviesmobiles.org/"><img alt="forumviesmobiles.org logo" data-bbox="115 20 185 40"/>](https://fr.forumviesmobiles.org/)  
Call on Universities and Professional Associations to Greatly Reduce Flying

Stay Grounded

Stay on the Ground

Proposal University Basel <br></br>

## Reflections about flying less in academia

Anthropology: In an era of climate change, our ethics code is clear: We need to end the AAA annual meeting

Archaeology: Decarbonising archaeology

Ethnomusicology: Academic flying, climate change, and ethnomusicology: Personal reflections on a professional problem

We don't have time to fly to a conference

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## Advocating flying less in leisure pursuits

Rock climbing (by Kevin Anderson): Meltdown: Climbers and climate change

Surfing (article about Fergal Smith by Paul Evans): Fergal Smith's Big Idea

Surfing (video about Fergal Smith): Beyond the Break

Birdwatching (by Javier Caletrío): Are we addicted to high-carbon ornithology? <br></br>

## Other

Tales of trying to fly less <br></br>

## Book

Beyond Flying: Rethinking Air Travel in a Globally Connected World. <br></br>

<!-- Notes -->

[^2]: Staying within this limit is a formidable challenge but the alternative of doing nothing is simply not an option. In organisations such as the conservative International Energy Agency (<https://www.oecd-ilibrary.org/energy/world-energy-outlook-2011-weo-2011-en>), the World Bank (<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warmer-world-this-century>) and PriceWaterhouse Cooper (<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warmer-world-this-century>) warned that current CO2 emission trends were on track for a global mean temperature rise of 4°C or more by the end of the century with 'devastating' consequences for the planet. This would mean 'sea level rise, waves, declining global food stocks, loss of ecosystems and biodiversity, and life-threatening sea level rise'. (<http://documents.worldbank.org/curated/en/865571468149107611/pdf/NonAsciiFileName0.pdf>). Kevin Anderson, one of the world's leading climate scientists, observed that 4° C warming is 'incompatible with any reasonable characterization of an organized, civilized global community' (Development Dialogue 61, 2012). Put simply, following this 'business as usual' scenario would lead to the erosion of economic and political conditions for civilized ways of life. More recent analyses by Brown and Caldeira (<https://www.nature.com/articles/nature24672>) suggest that in a business-as-usual scenario 'we can expect global temperature to rise anywhere in the range of 5.8 and 10.6 degrees Fahrenheit (3.2 to 5.9 degrees Celsius) over preindustrial levels by the end of the century, with a difference of about a factor of two between the most- and least-severe projections' (see <https://carnegiescience.edu/news>)

climate-model-predictions-could-be-most-accurate & video [https://www.youtube.com/watch?v=8PdM9\\_cDL5Y](https://www.youtube.com/watch?v=8PdM9_cDL5Y)). And dealing with different budgets is the behavior of other greenhouse gases. Climate scientists from Potsdam believe that the remaining budget is 700, 800, or 900 billion tonnes of CO<sub>2</sub> is largely beside the point. Due to the uncertainty in future (i.e. expected emissions and behaviour of other greenhouse gases), we simply do not know. Either way, emissions need unprecedented rate' (<https://cicero.oslo.no/no/posts/klima/how-much-carbon-dioxide-can-we-emit>). Should technological emissions exist in the second half of the century, reduction rates would still have to be 3-6% per annum during 2030-2050. But the technical and financial credibility of these technologies still needs to be demonstrated (<https://www.nature.com/articles/nclimate2392>). [^3]: The Intergovernmental Panel on Climate Change, a United Nations body, says in order to have a fair chance of limiting warming to 1.5 degrees, global CO<sub>2</sub> emissions need to be cut by at least half from 2019 by 2030 and reach 'net zero' by around 2050. These mitigation targets rely on the use of technologies to remove carbon from the atmosphere, but these technologies only exist, at best, as small pilot schemes and may never work at the required scale. Questions of fairness in the distribution of the effort to reduce emissions between wealthier industrialised countries and poorer countries, research on carbon budgets by the Tyndall Centre shows that if a fairness principle is observed so that developed countries have more leeway to reduce unacceptable levels of poverty, emission reductions by wealthier industrialised countries of at least 50% would be needed (<https://royalsocietypublishing.org/doi/10.1098/rsta.2010.0290>). Yet, even if not accounting for principles of fairness, we accept lower chances of staying below 2 degrees and assume net zero emissions in this century, mitigation rates still need to be 5% per annum globally according to Raupach, Davis, Peeters et al (<https://www.nature.com/articles/nclimate2384>). The emission reduction are unprecedented. [^5]: <https://tandfonline.com/doi/pdf/10.1080/15487733.2018.1458815> [^6]: <https://www.tandfonline.com/doi/pdf/10.1080/14693062.2014.965125> [^7]: [https://www-cdn.oxfam.org/s3fs-public/field\\_attachments/2015/02/extreme-carbon-inequality-021215-en.pdf](https://www-cdn.oxfam.org/s3fs-public/field_attachments/2015/02/extreme-carbon-inequality-021215-en.pdf) [^8]: See <http://piketty.pse.ens.fr/files/ChancelPiketty2015.pdf>. The richest 1% are responsible for 70% of emissions. This segment of the population includes many flying academics. Research by Wynes and Donnellan's survey of 1509 individuals across eight departments at the University of British Columbia found that almost one third of respondents fly, 8% produced half of all flight emissions and 25% produced 80% of all flight emissions ([https://pics.uvic.ca/sites/default/files/AirTravelWP\\_FINAL.pdf](https://pics.uvic.ca/sites/default/files/AirTravelWP_FINAL.pdf)). [^9]: See video <https://www.facebook.com/AlumniUoM/videos/1509359762446284/> [^10]: <https://www.inderscienceonline.com/doi/pdf/10.1504/IJISD.2006.012421> [^11]: Worldwatch Institute. Vital Signs 2006. That Are Shaping Our Future. Norton, 2006, p. 68. [^12]: <https://neweconomics.org/2015/06/a-fairer-way-to-fly>. In 2015, 20% of the population did not fly. Of those who did fly, 21% took 1 flight, 44% took 2-4 flights, 17% took 5-8 flights and 15% took more than 8 flights (<http://airlines.org/wp-content/uploads/2018/02/A4A-AirTravelSurvey-20Feb2018-FINAL.pdf>). [^13]: [http://www.ft.com/content/uploads/2017/10/FT-Watch\\_Green-Flying\\_2017.pdf](http://www.ft.com/content/uploads/2017/10/FT-Watch_Green-Flying_2017.pdf) [^14]: <https://www.iata.org/pressroom/pr/Pages/2018-10-10-Ending-Airlines-Tax-Holiday.aspx>. See <https://www.transportenvironment.org/newsroom/blog/ending-aviation's-tax-holiday>. According to Transport & Environment (<https://www.transportenvironment.org/press/eu-sat-data-showing-benefits-ending-airlines'-tax-break---leak>) 'Taxing aviation taxes sold in Europe would cut aviation emissions by 11% (16.4 million tonnes of CO<sub>2</sub>) and have no net impact on jobs or the economy as a whole while raising almost €27 billion in revenues every year, a leaked report for the European Commission shows (<https://www.transportenvironment.org/publications/leaked-european-commission-study-aviation-taxes>). The reduction in emissions, which cause climate breakdown, would be equivalent to removing almost 8 million cars from our roads.' Tax breaks for private jets are even more generous than those benefiting ordinary airlines. See article by The Economist (<https://www.economist.com/leaders/2019/03/07/private-jets-receive-ludicrous-tax-breaks-that-hurt-the-environment>) and report by the Institute for Policy Studies (<https://ips-dc.org/wp-content/uploads/2008/06/HighFlyersReport.pdf>). [^16]: See <https://www.transportenvironment.org/news/eu-urged-stand-firm-aircraft-emissions>. CORSIA is an approach by the United Nations aviation agency (ICAO) to 'offset' growth in aviation after 2020. A recent academic review concluded that this plan 'will not lead to any major emission reductions' (<https://www.tandfonline.com/doi/full/10.1080/14693062.2018.1562871>). See also report by the European Commission on the EU's aviation climate strategy ([https://ec.europa.eu/clima/sites/clima/files/ets/docs/clean\\_dev\\_mechanism\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/ets/docs/clean_dev_mechanism_en.pdf)) and Kevin Anderson's views on offsetting (<https://kevinanderson.info/blog/wp-content/uploads/2013/02/Offsetting-interview-2013-02-14.pdf>). Climate-Change-Pre-edit-April-20121.pdf). [^17]: In the UK the organisation Fellow Travellers is campaigning for the 'frequent flyer levy' that would tax people according to how often they fly (<http://afreeride.org/>). [^18]: See <https://www.transportenvironment.org/content/uploads/2019/02/The-Illusion-of-Green-Flying.pdf>. Aviation is responsible for 2.4% of global energy-related CO<sub>2</sub> emissions. However, the global warming impact of aviation is larger. This is because emissions at high altitude have an enhanced warming effect through the process of 'radiative forcing' (<https://www.britannica.com/science/radiative-forcing>). According to a consensus report, radiative forcing is thought to more than double the global warming impact of aviation (an estimated 4.9% of man-made



<https://www.transportenvironment.org/news/aviation-2-3-times-more-damaging-climate-industry-claims>). [^19]: The production of synthetic jet fuels (synthetic fuels) from hydrogen and carbon dioxide (CO<sub>2</sub>) is one possible way to decarbonise aviation. Synthetic electro-fuels (synthetic fuels) produced from hydrogen with carbon from CO<sub>2</sub>) is one possible way to decarbonise fuel demand according to the environmental organisation Transport Environment (<https://www.transportenvironment.org/publications/roadmap-decarbonising-european-aviation>). However, it is a significant task. T&E argues that ‘using electrofuels to meet expected remaining fuel demand for aviation in 2050 would require electricity equivalent to some 28% of Europe’s total electricity generation in 2015 or 95% of the electricity currently generated in Europe. Fellow Travellers notes that the development of electro-fuels is ‘almost certainly necessary, but it will not be sufficient to bring aviation emissions within safe limits; even if implemented in full’ (<https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/Electric+Dreams.pdf>). A study from the International Council on Clean Transportation on the cost of producing alternative jet fuels in the European Union found that overall the cost, even for the cheapest, is significantly higher than the cost of petroleum, ‘necessitating substantial policy support for them to reach the market’ (<https://www.theicct.org/publications/supporting-alternative-jet-fuels-european-union>). Friends of the Earth argues that biofuels cannot be produced in enough quantities to make a difference without creating serious problems for the environment. Biofuel production threatens food supplies and farmland, destroys forests and other valuable habitat, increases greenhouse gases, and diverts support from other renewable energy sources. (<https://friendsoftheearth.uk/natural-resources/4-reasons-biofuels-arent-answer-climate-change>). [^20]:

<http://www.bbc.com/future/story/20180814-norways-plan-for-a-fleet-of-electric-planes> [^21]: In July 2015 an Airbus e-Fan aircraft crossed the English Channel in 36 minutes (<https://www.airbus.com/public-affairs/brussels/our-topics/environment>). This is a technology demonstrator and engineers acknowledge that the roadmap for electric planes is a long one. The focus is moving towards regional aircraft with electric hybrid technology (see also <https://solarimpulse.com/>). According to consultant Roland Berger, in October 2018 there were around 130 different electric aircraft programs in development worldwide (including 55 in the European Union (Europe)). Most of these projects concern urban air taxis and personal flying. Regional aviation and large commercial aircraft represent only 10% and 2% of the projects (<https://www.rolandberger.com/en/Publications/Electrical-propulsion-usher-innovation-in-aerospace.html>). For further information about the carbon mitigation potential of electric aviation see the report from Fellow Travellers (<https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/Electric+Dreams.pdf>). [^22]: <https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/Electric+Dreams.pdf> [^23]:

[http://www.europarl.europa.eu/RegData/etudes/STUD/2015/569964/IPOL\\_STU\(2015\)569964\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2015/569964/IPOL_STU(2015)569964_EN.pdf) [^24]:

<https://www.carbonbrief.org/analysis-aviation-to-consume-half-uk-1point5c-carbon-budget-2050> [^25]:

<https://www.hybridairvehicles.com/> [^26]: <https://www.tandfonline.com/doi/pdf/10.1080/14693062.2014.965125> [^27]:

<https://www.sciencedirect.com/science/article/abs/pii/S0959378016300450> [^28]:

<http://archive.news.indiana.edu/releases/iu/2016/06/attari-climate-credibility.shtml> [^29]: See also <https://www.nature.com/articles/2018-0647-4> and ‘Climate change communicators’ carbon footprints affect their audience’s policy

support’ [https://link.springer.com/epdf/10.1007/s10584-019-02463-0?author\\_access\\_token=b69Hzd-s4u\\_qMduJa4Mcuve4RwlQNchNByi7wbcMAY5x7LkMNzBCZKpUgqEwRVptEnECWvvKY3ggB0pZirzE8vmwXl](https://link.springer.com/epdf/10.1007/s10584-019-02463-0?author_access_token=b69Hzd-s4u_qMduJa4Mcuve4RwlQNchNByi7wbcMAY5x7LkMNzBCZKpUgqEwRVptEnECWvvKY3ggB0pZirzE8vmwXl)

<https://www.tandfonline.com/doi/pdf/10.1080/14693062.2014.965125> [^29]: <https://rationalinsurgent.com/2013/11/04/northern-led-xboulder-civil-resistance-and-the-3-5-rule/>. See also <https://science.sciencemag.org/content/sci/364/6436/132.full.pdf?ijkey=FNwWPomZvzwSU&keytype=ref&siteid=sci>

[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3283157](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3283157) [^31]: For some people, becoming fully aware of the impact of climate change on the climate is often followed by feelings of guilt about flying. In Sweden there is a neologism ‘flygskam’ (‘flying shame’) which describes these feelings. It is important to clarify that the flying less movement as understood by many visible figures emphasises leading by example to inspire others, not shaming those who fly. [^32]: <https://www.rebeccawillis.co.uk/>. Rebecca Willis’ research ‘suggests a renewed political mandate for climate action in the UK (...). To summarise:

(1) The targets enshrined in the Climate Change Act need to be strengthened, with responsibility shared across government, businesses and local areas. (2) Greater use of deliberative processes, such as Citizen’s Assemblies, could allow politicians, citizens and businesses, on equal terms, to assess evidence and agree how targets could be met in ways that improve social and economic outcomes. (...) [^33]: Quote from Peter Kalmus’ acceptance speech for the Transition US Walking the Talk Award. It is important to note that for some individuals, doing everything within their means, especially with the local community, is a meaningful way to cope with grief’. See Hope and mourning in the Anthropocene: Understanding ecological grief while our world changes around us (<https://thenarwhal.ca/hope-and-mourning-in-the-anthropocene/>) and The science of self-care: How climate researchers are coping with the U.N. report (<https://grist.org/article/the-science-of-self-care-how-climate-researchers-are-coping-with-the-u-n-report/>).

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[https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020\\_rd300&plugin=1](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_rd300&plugin=1) [<sup>35</sup>]: The distance is 7100 km between London and New York for 3450 miles. The climate impact of a passenger flying in economy/coach class is 0.8 kg CO<sub>2</sub>-e. Therefore the resulting figure is 2,76 tonnes CO<sub>2</sub>-equivalent. NASA atmospheric scientist Peter Kalmus (<https://peterkalmus.net/about/>) explains these calculations in his book *Being the Change* (<https://beingthechangebook.com/>). [<sup>36</sup>]: <https://www.nature.com/articles/461472a> [<sup>37</sup>]: <https://iopscience.iop.org/article/10.1088/1748-9326/8/1/014016/pdf> [<sup>38</sup>]: See Footprint Network (<https://www.footprintnetwork.org/our-work/ecological-footprint/#worldfootprint>) and *A good life for all within planetary boundaries* (<https://www.nature.com/articles/s41893-018-0021-4>). According to WWF's report *Living Beyond Nature's Limits*, the EU uses almost 20% of the Earth's biocapacity although it comprises only 7% of the world population. In other words, 2.8 planets would be needed if everyone consumed at the rate of the average EU resident. This is well above the world average which is approximately 1.7 planets. Whether at the regional or global level, human demand on nature is way beyond what is sustainable for our planet' ([http://d2ouvy59p0dg6k.cloudfront.net/downloads/wwf\\_eu\\_overshoot\\_day\\_\\_\\_living\\_beyond\\_nature\\_s\\_limits\\_web.pdf](http://d2ouvy59p0dg6k.cloudfront.net/downloads/wwf_eu_overshoot_day___living_beyond_nature_s_limits_web.pdf)). [<sup>39</sup>]: <https://medium.com/@kovamic/tales-of-trying-to-fly-less-5883a1858c3f> [<sup>40</sup>]: <https://noflyclimatesci.org/biographies> [<sup>41</sup>]: <https://www.flightfree.co.uk/post/evelina-utterdahl-earth-wanderess> [<sup>42</sup>]: <https://www.sciencedirect.com/science/article/pii/S1470160X13002306> [<sup>43</sup>]: Attending conferences accounts for most of academia's carbon footprint (see <https://mathemagicalconservation.wordpress.com/2017/08/10/conferences-urgently-need-environmental-policies/>) and most of the carbon footprint of international conferences comes from transatlantic or intercontinental flights (see <https://www.onlinelibrary.wiley.com/doi/abs/10.1111/1746-692X.12106>). [<sup>44</sup>]: <https://tyndall.ac.uk/publications/tyndall-working-paper/2015/towards-culture-low-carbon-research-21st-century> [<sup>45</sup>]: <https://loco2.com/> [<sup>46</sup>]: <https://www.seat61.com/> [<sup>47</sup>]: <https://medium.com/wedonthavetime/the-smart-way-to-make-others-give-up-flying-49cd6bd1272e> [<sup>48</sup>]: <https://www.bbc.co.uk/news/av/world-europe-46362159/the-two-swedish-mums-who-want-people-to-give-up-flying-for-a-year> [<sup>49</sup>]: <https://phys.org/news/2019-04-flight-shame-swedes-rethinking-air.html> [<sup>50</sup>]: <https://www.wwf.se/pressmeddelande/wwfs-klimatbarometer-allt-fler-valjer-bort-flyg-och-kott-och-kvinnorna-gar-fore-3241404/> [<sup>51</sup>]: <https://www.dn.se/nyheter/sverige/trenden-har-vant-flygresandet-minskar/> [<sup>52</sup>]: <https://www.euractiv.com/section/climate-environment/news/swedens-new-carbon-tax/> [<sup>53</sup>]: <https://www.sitra.fi/en/people/aarne-granlund/> [<sup>54</sup>]: [https://valtioneuvosto.fi/artikkeli/-/asset\\_publisher/ilmastobarometri-2019-suomalaiset-haluavat-ilmastokriisin-ratkaisut-politiikan-ytimeen?\\_101\\_INSTANCE\\_3wyslLo1Z0ni\\_languageId=en\\_US](https://valtioneuvosto.fi/artikkeli/-/asset_publisher/ilmastobarometri-2019-suomalaiset-haluavat-ilmastokriisin-ratkaisut-politiikan-ytimeen?_101_INSTANCE_3wyslLo1Z0ni_languageId=en_US) [<sup>55</sup>]: <https://www.apnews.com/b31a0e98d1134f8b94ae8db5f5d0d2b8> [<sup>56</sup>]: <https://www.msn.com/en-us/news/technology/flight-shame-has-swedes-rethinking-air-travel/ar-BBVMEbg> [<sup>57</sup>]: <https://www.thelocal.se/20190411/reader-voices-how-do-internationals-in-sweden-feel-about-the-growing-anti-flying-campaigns> [<sup>58</sup>]: <https://displacements.jhu.edu/> [<sup>59</sup>]: <https://anthrodendum.org/2018/01/13/climate-change-ethics-code-end-aaa-annual-meeting/>

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Sciences sociales

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