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The flying less movement

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Compared to the cacophony of disparate voices praising the virtues of driving less, cycling and walking, calls for rethinking our flying habits have until recently been few and far between. Yet the number of advocates of ‘flying less’ has been steadily growing for more than a decade. As their voices begin to echo further afield, they have turned what was until recently a rather niche debate into a movement 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 not just at home through, for example, recycling, using more energy-efficient appliances, or driving less, but also in activities away from home that have often involved flying such as holidaymaking and work-related conferences and meetings. Although the size of the movement is not known, 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 gold medal Olympian Bjorn Ferry, Swedish opera singer Malena Ernman and her daughter Greta Thunberg, Maja Rosén and Lotta Hammar, founders of We Stay Grounded, and climate scientists such as Alice Larkin and Kevin Anderson in the UK, Peter Kalmus and Katharine Hayhoe in USA.

Key strands of their message, as articulated by some of its most visible figures, can be succinctly outlined in the following points:
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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 aiming at lower energy consumption in a more or less distant future. Yet, what matters are not levels of technological efficiency in say 2080 but cumulative greenhouse emissions which could trigger a tipping point in climate dynamics. This means that we have a limited 'carbon budget' that must be adhered to if average global temperatures are to stay below what has been agreed as being a safe threshold^1. The size of this budget depends on the probability of exceeding the 1.5 or 2 degrees threshold between acceptable and dangerous climate change[^2]. To meet the commitment of the Paris Agreement of keeping temperatures 'well below 2 degrees' (and aiming towards 1.5 degrees) we have a carbon budget of 655 billion tonnes of CO2 (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 greater mitigation effort, they have to cut carbon emissions by more than 10% per year[^3]. The problem is that adapting everyday technologies to new energy systems can take decades, and therefore there is no alternative but to reduce energy demand[^4]. This means changes in lifestyles[^5], and for those who have normalised high-carbon lifestyles this means flying less or not flying at all[^6].
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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 can be emitted by others. Discussions about the responsibility for reducing emissions have tended to focus on emissions by countries. Turning their focus to individuals, recent reports by Oxfam[^7] and the French economists Lucas Chancel and Thomas Piketty have shown that the richest 10% of the global population is responsible for 50% of carbon emissions[^8]. Climate scientist Kevin Anderson has estimated that if this privileged group were to reduce its emissions to those of the average European citizen, global carbon emissions would be reduced by 33%, within one or two years[^9]. Poor people who will be most affected by climate change are those who emit less carbon and whose well-being could be

significantly improved with even modest increases in energy consumption. There is one pie for all but at the moment there are some who are eating most of it while others pick at the crumbs that fall from the table.
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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 or at least a normal aspect of holidaymaking and certain jobs such as academic research. Yet, only 2-3% of the world's population flies internationally in any given year and 95%[^10] have never been on a plane[^11]. Seen from a global perspective, flying is an elite form of transport. Even in some western societies, flying is the privilege of a few. In the UK 15% of the population is responsible for 70% of all flights[^12].
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Graphic 1. Most flights abroad in England are taken by a small, affluent part of the population. Credit afreeride.org
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Flying is artificially cheap

Worldwide more than 420 new airports, 121 new runways, 205 runway extensions, 262 new terminals and 175 terminal extensions are currently being planned or under construction[^13]. The aviation industry expects the number of passengers to double to 8.2 billion in 2037[^14]. But this growth is being aided by low-tax or tax-free fuels[^15] and a lack of regulation regarding carbon emissions – aviation has repeatedly been left outside international climate negotiations such as COP21 and current plans to offset aviation emissions after 2020 have fundamental flaws[^16]. The current system of mass air travel relies on a number of policies and those policies can be changed[^17]. The expansion of aviation is not inevitable.
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Beware of techno-optimism…

Despite claims by the aviation industry such rapid growth is not 'green'[^18]. There is no such thing as sustainable aviation. Innovation in fuel efficiency and less polluting fuels are not enough to make aviation a clean mode of transport, especially considering the current and expected rapid growth in demand[^19]. Norway's airport operator has noted that electric planes will be available by 2050 to operate short-haul

flights[^20]. There are at least four problems with this statement. Firstly, it still has to be proved that large commercial electric planes will be available by then and that they will deliver what is being promised today[^21]. It is important to remember that in the early stages of development new technologies often go through a hype phase in which the technical problems are consciously downplayed while the potentials are overstated so as to attract investment. Secondly, even if commercial electric planes could work for shorter distances, long-haul flights, which in the UK accounts for around 72% of aviation emissions, would still operate with conventional fuel[^22]. Thirdly, regardless of whether electric planes are available then, the key concern is to reduce emissions as fast and as widely as possible within 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[^23]. In a 2015 report, the research organisation Öko-Institut warned the European Parliament that international aviation's CO2 emissions may reach 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 budget will be consumed by aviation by 2050[^24]. It is possible that other forms of commercially viable air travel such as air ships will emerge that will make low-carbon aviation possible[^25]. Investment is being put into this possibility, but for now avoiding dangerous climate change means reducing aviation demand and changing one's lifestyle accordingly[^26].
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… 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 nurtured complacency and achieved very little: green-house emissions keep growing. Reporting clearly and bluntly about the serious risks ahead is more effective than spinning a cheerful yarn about climate change as recent research suggests[^27].
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Integrity matters

When communicating science, it is important to 'walk the talk'[^28]. If science says that current trends in aviation are incompatible with avoiding dangerous climate change, then it makes sense to act accordingly, otherwise one's talk may be

interpreted by others as cheap virtue signalling. Lecturing people about the risks of climate change and its effects on the planet and poor people while sitting on a plane will ultimately weaken trust in scientists[^29].
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Image 1. Climate activist Greta Thunberg on the train, leading by example.

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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 infrastructures that enable individuals to change their habits. However, the argument that a focus on individual action diverts attention from systemic change is premised on a false dichotomy. Individual action does matter because it is a catalyst for collective action. Four interrelated issues to consider:
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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 minorities and their gestures matter, especially when, as is often the case with frequent flyers, these people occupy influential positions and their voices can be heard more loudly than others. The actions of a small but visible segment of the population could be a symbolic but essential catalyst for wider cultural change. Weren’t the suffragette, abolitionist, and American civil rights movements initially made up of 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 Westlake found that of those who know such an individual, around half fly less as a result, and around three quarters say knowing that person has changed their attitudes[^30]. When communicated effectively, the action of an individual sends ripples across the many social relations that each of us is part of – local communities, work places, professional associations, hobby and sports

societies[^31]. The larger the number of these distinct 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 others know 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 followers. Research conducted from 2014 to 2018 by Rebecca Willis from Green Alliance on how climate change looks from the politician’s point of view found that most British politicians understood the need to act on climate but it was not straightforward for them to do so. Reasons for this included the fact that climate change was not yet something discussed as part of mainstream politics and talking about climate could be a ‘career-limiting move’. Another reason was that ‘politicians feel under very little pressure to act on climate change. They report limited interest from their constituents, and need to find ways to make climate action relevant to the daily lives and concerns of the electorate[^32].’ Following the ‘climate spring’ of 2019 UK politicians now need to respond to higher levels of public concern. A key insight from this research still is that if political will cannot exist without public consent, with your personal actions you are contributing to make ambitious policies possible.
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In a nutshell

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

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Flying probably dominates your emissions

In 2016 the greenhouse emissions per capita in the European Union was 8.7 tonnes of carbon (measured in CO2-equivalent)[^34]. Just one round transatlantic flight (London - New York) in economy / coach class produces 2.76 tonnes per passenger[^35]. So if flying is currently an integral aspect of your lifestyle, one of the most effective things you can do to prevent climate breakdown is to fly less.

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Flying less is about living within planetary boundaries[^36]

The annual emissions budget per person per year required by 2050 in order to stabilize warming below 2 degrees is 2.1 tonnes and for 1.5 degrees it is less than one tonne[^37]. Since the world is decades away from viable clean flying technologies, flying as usual has no place in a liveable planet[^38].
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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 one’s life, a rediscovery of the pleasures of slow travel and simple living[^39]. Above all it is a commitment to ‘live with the future’, as if the climate mattered 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 living in Helsinki. Aarne enjoys fly fishing in waters near Helsinki or in Lapland where he travels using extremely low-carbon methods.

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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-set[^40] when non-flying options are properly considered and that aviation is not as necessary as it may seem – even if you are a travel writer as Evelina Utterdahl has demonstrated[^41]! Frequent flyers including many academics should take an opportunity to re-set their values and rethink why they fly and whether it is strictly necessary[^42]. Do I really need to attend that conference[^43]? Why not an on-line presentation? 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 keep updated about your research field by using the many on-line resources available? Is

flying really unavoidable or is it that I am reluctant to change my habits? Work places can help in promoting a new culture of doing business and research. For example, the Tyndall Centre for Climate Change Research has issued guidelines for helping their own staff to consider every non-flying option possible[^44]. This is now being used by other institutions.
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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 still possible to travel comfortably by these means of transport. The flying less movement hopes that enough people will demand and use lower carbon land and sea travel options so that eventually it becomes easier to visit distant places without jumping on a plane. This was the aim of Kate Andrews, co-founder of Loco2[^45], a London-based start up whose mission is to make booking a train in Europe as easy as booking a flight. Many people plan their railway journeys with the help of The Man in Seat 61[^46].
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A growing movement

Flying is so engrained in the lifestyles of more affluent segments that the possibility that sometime in the near future people may fly less, much less, may seem implausible. Yet recent developments suggest that what we regard as normal in travel can change faster than some people realize. In Sweden, the debate about flying has been taking place in mainstream media since January 2018 and is now part of everyday conversations. Celebrities such as Olympian gold medallist and Sports TV presenter Björn Ferry and opera singer Malena Ernman, and ordinary citizens such as mothers Maja Rosén[^47] and Lotta Hammar who launched the campaign Flight Free 2019 (Flygfritt 2019[^48]), have played a key role in raising awareness. According to Agence France-Presse[^49], ‘in March 2019 the World Wildlife Foundation published a survey indicating that nearly one in five Swedes had chosen to travel by rail rather than by air in order to minimise their environmental impact[^50].’ According to the same source, ‘a survey published in Sweden's leading travel magazine, Vagabond, said 64 per cent of those who travelled abroad less last year did so because of climate reasons.’ A separate survey by Swedish Radio showed that the climate is the most important political topic for young people today. After a sustained growth in the number of airline passengers for almost ten years (from 31 million in 2009 to more than 39 million in 2018) growth of international flights slowed down in 2018 (from 9%

to 4%) and there were fewer domestic and international charter flights than in the previous year. While the hot summer and the problems faced by local budget airlines have been noted as plausible causes, data for the first quarter of 2019 show a continuation of trends registered in 2018 (378,000 fewer passengers with respect to the same period in the previous year representing a 4.5% fall in demand[^51]). It is being suggested that the new aviation tax[^52] 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 on the ground next year. Credit Flight Free UK.

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The debate about flying less has spread to Finland. According to sustainability researcher Aarne Granlund[^53], the debate 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[^54] shows that 'Four out of five Finns consider that urgent action is needed to mitigate climate change' and a third of the population has calculated its own carbon footprint. Interestingly, 'About 40% of the Finns have reduced flying because of climate reasons. About the same share of the 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 Facebook group called "Maata pitkin matkustavat", connecting people committed to ground travel, has organised its own flying less travel fair.

Signs of an incipient new culture of travel in Scandinavia are visible in the decisions of newspapers in Sweden and Denmark to refocus their travel sections to cover domestic and European destinations easily accessible by public transport. Sweden's third most popular morning newspaper, Svenska Dagbladet, is halving the number of reports about destinations further than a five hour flight, and doubling the number of articles about destinations in the Nordic countries. According to Associated Press[^55], Politiken, 'one of Denmark's main newspapers is ceasing domestic air travel and reducing international flights for assignments to a bare minimum. [...] The

paper's travel section will [now] cover...destinations easily reachable by public transportation.’ In the midst of these developments, train bookings are rising. According to Agence France-Presse[^56], passenger numbers at state train operator SJ reached a record 32 million in 2018 ‘a 21 per cent boost in business travel during the 2018-2019 winter, and the government has announced plans to reintroduce night trains to major European cities before the end of its mandate in 2022.’ In 2018 Interrail ticket sales increased by 50%. ’ Catherine Edwards reports that ‘Sweden made a commitment in its spring budget to invest 40 million kronor (3.8 million euros) on investigating alternative methods of transport to flying, including overnight trains to the continent[^57].

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, especially Fridays 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. Examples include Bristol University, Edinburgh University, Lancaster Environment Centre, UK Innovation Agency, the Met Office, Lund University 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 in 2018 in order to reduce travel-related carbon emissions and to facilitate a broader participation from academics facing visa restrictions[^58]. Calls are being made for other big conferences to follow suit. Anthropologist Jason Hickel has called for an end of the annual meeting of the American Anthropological Association (AAA)[^59] arguing that in an age of dangerous climate change, unnecessary flights cannot be morally justified and go against the professional ethics code of the AAA which states that ‘Anthropological researchers must do everything in their power to ensure that their research does not harm the safety of the people with whom they work.’ He calls on anthropologists to

step forward and join others who are already working to create a low-carbon research culture: ‘We as anthropologists – we as the AAA – 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 that 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 usher in a better world. Let’s make it happen, starting in 2018. We have little time to lose.’
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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 work-related flying 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 abroad). The inertias of the system are there constraining individuals’ desires and aspirations for low-carbon travel. The flying less movement places the emphasis 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.
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Acknowledgements

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

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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

Call on Universities and Professional Associations to Greatly Reduce Flying

Stay Grounded

Stay on the Ground

Proposal University Basel
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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?

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Other

Tales of trying to fly less
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Book

Beyond Flying: Rethinking Air Travel in a Globally Connected World.
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<!-- Notes -->
[^2]: Staying within this limit is a formidable challenge but the alternative of doing nothing is simply not an option. In the early 2010s 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-warns-dramatically-warmer-world-this-century) and PriceWaterhouse Cooper (http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century) warned that current CO2 emission trends were on track for a global mean surface temperature rise of 4°C or more by the end of the century with ‘devastating’ consequences for the planet. This would mean ‘extreme heat 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.pd

). Kevin Anderson, one of Britain's top climate scientists, observed that 4° C warming is 'incompatible with any reasonable characterization of an organized, equitable and civilized global community' (Development Dialogue 61, 2012). Put simply, following this 'business as usual' scenario would lead to an erosion of economic and political conditions for civilized ways of life. More recent analyses by Brown and Caldeira published in Nature (https://www.nature.com/articles/nature24672) suggest that in a business-as-usual scenario 'we can expect global temperatures to increase 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—a difference of about a factor of two between the most- and least-severe projections' (see https://carnegiescience.edu/news/more-severe-climate-model-predictions-could-be-most-accurate & video https://www.youtube.com/watch?v=8PdM9_cDL5Y). Another key issue in dealing with different budgets is the behaviour of other greenhouse gases. Climate scientist Glen Peters clarifies that 'whether the remaining budget is 700, 800, or 900 billion tonnes of CO2 is largely beside the point. Due to the uncertainty in future no-CO2 pathways (i.e. expected emissions and behaviour of other greenhouse gases), we simply do not know. Either way, emissions need to go to zero at an unprecedented rate' (https://cicero.oslo.no/no/posts/klima/how-much-carbon-dioxide-can-we-emit). Should technologies of negative emissions exist in the second half of the century, reduction rates would still have to be 3-6% per annum during 2030-2050 (IPPC 2014). 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 that in order to have a fair chance of limiting warming to 1.5 degrees, global CO2 emissions need to be cut by at least half from their 2010 levels 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. [^4]: Regarding questions of fairness in the distribution of the effort to reduce emissions between wealthier industrialised countries and developing countries, research on carbon budgets by the Tyndall Centre shows that if a fairness principle is observed so that developing countries have more leeway to reduce unacceptable levels of poverty, emission reductions by wealthier industrialised countries of at least 10% per annum would be needed (https://royalsocietypublishing.org/doi/10.1098/rsta.2010.0290). Yet, even if not accounting for principles of fairness, if we accept lower chances of staying below 2 degrees and assume net zero emissions in this century, mitigation rates still need to

be around 5% per annum globally according to Raupach, Davis, Peeters et al (https://www.nature.com/articles/nclimate2384). These levels of 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/file_attachments/mb-extreme-carbon-inequality-021215-en.pdf [^8]: See http://piketty.pse.ens.fr/files/ChancelPiketty2015.pdf. The richest 20% is responsible for 70% of emissions. This segment of the population includes many flying academics. Research by Wynes and Donner consisting of a survey of 1509 individuals across eight departments at the University of British Columbia found that almost one third of academics did not 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). [^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 2006-2007: The Trends That Are Shaping Our Future. Norton, 2006, p. 68. [^12]: https://neweconomics.org/2015/06/a-fairer-way-to-fly. In 2017 52% of the US 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 9 or more flights (http://airlines.org/wp-content/uploads/2018/02/A4A-AirTravelSurvey-20Feb2018-FINAL.pdf). [^13]: http://www.ftwatch.at/wp-content/uploads/2017/10/FT-Watch_Green-Flying_2017.pdf [^14]: https://www.iata.org/pressroom/pr/Pages/2018-10-24-02.aspx [^15]: 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 kerosene sold in Europe would cut aviation emissions by 11% (16.4 million tonnes of CO2) 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 carbon emissions, which cause climate breakdown, would be equivalent to removing almost 8 million cars from our roads.’ Tax breaks for private aviation 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 Nation's aviation agency (ICAO) to 'offset' growth in aviation after 2020. A recent academic review concluded that this plan 'will not deliver any major emission reductions' (https://www.tandfonline.com/doi/full/10.1080/14693062.2018.1562871). See also report about offsetting in EU's aviation climate strategy (https://ec.europa.eu/clima/sites/clima/files/ets/docs/clean_dev_mechanism_en.pdf) and climate scientist Kevin Anderson's views on offsetting (https://kevinanderson.info/blog/wp-content/uploads/2013/02/Offsetting-interview-for-Nature-Climate-Change-Pre-edit-April-20121.pdf). [^17]: In the UK the organisation Fellow Travellers is campaigning for the introduction of a 'frequent flyer levy' that would tax people according to how often they fly (http://afreeride.org/). [^18]: See https://stay-grounded.org/wp-content/uploads/2019/02/The-Illusion-of-Green-Flying.pdf. Aviation is responsible for 2.4% of global energy-related CO2 emissions. However, the global warming impact of aviation is larger. This is because emissions at high altitude have an enhanced impact on climate through the process of 'radiative forcing' (https://www.britannica.com/science/radiative-forcing). According to a conservative estimate radiative forcing is thought to more than double the global warming impact of aviation (an estimated 4.9% of man-made global warming) (https://www.transportenvironment.org/news/aviation-2-3-times-more-damaging-climate-industry-claims). [^19]: The potential of biofuels and alternative sustainable fuels to decarbonise aviation is limited. Synthetic electro-fuels (synthetic fuel produced through combining hydrogen with carbon from CO2) 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 not an easy task. T&E argues that 'using electrofuels to meet expected remaining fuel demand for aviation in 2050 would require renewable electricity equivalent to some 28% of Europe's total electricity generation in 2015 or 95% of the electricity currently generated using renewables in Europe. Fellow Travellers notes that the development of electro-fuels is 'almost certainly necessary, but it will not be sufficient on its own 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 much higher than the cost of petroleum, ‘necessitating substantial policy support for them to reach the market’ (https://www.theicct.org/publications/cost-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 farmers’ livelihoods, 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 two-seater electric aircraft crossed the English Channel in 36 minutes (https://www.airbus.com/public-affairs/brussels/our-topics/environment/e-mobility.html). This is a technology demonstrator and engineers acknowledge that the roadmap for electric planes is a long one. Their plan is to move towards regional aircraft with electric hybrid technology (see also https://solarimpulse.com/). According to consultancy Roland Berger, in October 2018 there were around 130 different electric aircraft programs in development worldwide (including 55 in the US and 58 in Europe). Most of these projects concern urban air taxis and personal flying. Regional aviation and large commercial aircraft respectively represent only 10% and 2% of the projects (https://www.rolandberger.com/en/Publications/Electrical-propulsion-ushers-in-new-age-of-innovation-in-aerospace.html). For further information about the carbon mitigation potential of electric aviation see the report by Fellow Tavellers (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_E [^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/s41586-018-0647-4 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_qMduJa4Mcuve4RwlQNchNByi7wbcMAY5x7LkMNzBCZKpUgqEwRVptEnECWvvKY3ggB0pZi bcb0_7uABMe1lNpZKV-l909WpM-CljqH6brMYIljVVw%3D%3D [^29]:

https://rationalinsurgent.com/2013/11/04/my-talk-at-tedxboulder-civil-resistance-and-the-3-5-rule/. See also https://science.sciencemag.org/content/sci/364/6436/132.full.pdf?ijkey=FNwWPomZvzwSU&k
[^30]: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3283157 [^31]: For some people, becoming fully aware of the impact of aviation on the climate is often followed by feelings of guilt about flying. In Sweden there is a neologism ‘flygskam’ (‘flying shame’) to refer to 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 ‘suggest ways of developing 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 departments and local areas. (2) Greater use of deliberative processes, such as Citizen’s Assemblies, could allow politicians, citizens and experts to meet on equal terms, to assess evidence and agree how targets could be met in ways that improve social and economic outcomes. (3) There is a need to design policies which themselves build engagement and public support, rather than assuming passive consent from the electorate. (…) [^33]: Quote from Peter Kalmus’ acceptance speech for the Transition US Walking the Talk Award. It is important to add here that, for some individuals, doing everything within their means, especially with the local community, is a meaningful way to cope with ‘climate 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/). [^34]: https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_r
[^35]: The distance in miles between London and New York is 3450 miles. The climate impact conversion factor for passenger miles flying in economy/coach class is 0.8 kg CO2-e. Therefore the resulting figure is 2,76 tonnes CO2-equivalent. NASA atmospheric scientist Peter Kalmus (https://peterkalmus.net/about/) explains these calculations in his book Being the Change (https://beingthechangebook.com/). [^36]: https://www.nature.com/articles/461472a [^37]: https://iopscience.iop.org/article/10.1088/1748-9326/8/1/014016/pdf [^38]: 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_nat). [^39]: https://medium.com/@kovamic/tales-of-trying-to-fly-less-5883a1858c3f [^40]: https://noflyclimatesci.org/biographies [^41]: https://www.flightfree.co.uk/post/evelina-utterdahl-earth-wanderess [^42]: https://www.sciencedirect.com/science/article/pii/S1470160X13002306 [^43]: 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). [^44]: https://tyndall.ac.uk/publications/tyndall-working-paper/2015/towards-culture-low-carbon-research-21st-century [^45]: https://loco2.com/ [^46]: https://www.seat61.com/ [^47]: https://medium.com/wedonthavetime/the-smart-way-to-make-others-give-up-flying-49cd6bd1272e [^48]: https://www.bbc.co.uk/news/av/world-europe-46362159/the-two-swedish-mums-who-want-people-to-give-up-flying-for-a-year [^49]: https://phys.org/news/2019-04-flight-shame-swedes-rethinking-air.html [^50]: https://www.wwf.se/pressmeddelande/wwfs-klimatbarometer-allt-fler-valjer-bort-flyg-och-kott-och-kvinnorna-gar-fore-3241404/ [^51]: https://www.dn.se/nyheter/sverige/trenden-har-vant-flygresandet-minskar/ [^52]: https://www.euractiv.com/section/climate-environment/news/swedens-new-carbon-tax/ [^53]: https://www.sitra.fi/en/people/aarne-granlund/ [^54]: https://valtioneuvosto.fi/artikkeli/-/asset_publisher/ilmastobarometri-2019-suomalaiset-haluavat-ilmastokriisin-ratkaisut-politiikan-ytimeen?_101_INSTANCE_3wyslLo1Z0ni_languageId=en_US [^55]: https://www.apnews.com/b31a0e98d1134f8b94ae8db5f5d0d2b8 [^56]: https://www.msn.com/en-us/news/technology/flight-shame-has-swedes-rethinking-air-travel/ar-BBVMEbg [^57]: https://www.thelocal.se/20190411/reader-voices-how-do-internationals-in-sweden-feel-about-the-growing-anti-flying-campaigns [^58]: https://displacements.jhu.edu/ [^59]: https://anthrodendum.org/2018/01/13/climate-change-ethics-code-end-aaa-annual-meeting/

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