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Private aviation

A dirty industry thriving on climate destruction, greenwashing and inequality

The growing impact of private aviation

Private aviation is the pinnacle of what's wrong with our transport system – it's the most polluting and most unequal form of transport on this planet, causing record emissions of an average 1.3 kg of CO_2 per person per kilometre – tenfold of a regular flight (per person per kilometre) and even 50 times more than an average train ride in Europe (per person per kilometre). A private flight can emit two tonnes of CO_2 in just one hour, that is double the yearly average CO_2 emissions of one person living in Africa. Their impact on the environment is highly disproportionate to their benefits, as is their excessive energy waste. It is estimated that private flights in the EU consume 950 million litres of jet fuel per year.[1]

This excessive waste of energy by the private aviation industry and the disproportionately negative impact it has on the climate are becoming more and more of a problem. Private jet use has increased dramatically over the last few years**.** According to a study recently published by Greenpeace Central and Eastern Europe and carried out by the Dutch research institute CE Delft, private air travel has increased by a massive amount in Europe over the last three years. The study shows that in 2022 alone, private jet flights in Europe (EU27, UK, Norway and Switzerland) increased by a staggering 64% compared to the previous year: from 350,078 flights in 2021 to 572,806 in 2022. These private flights in Europe caused 3,385,538 tonnes of CO_2 emissions, which is equal to the average yearly CO_2 emissions of 555,000 EU

[1] According to the European Business Aviation Association, private flights caused 2.12 million tonnes of CO_2 in 2019, which is equivalent to around 0.67 million tonnes of jet fuel (1 kg jet fuel causes 3.14 kg of CO_2). 1 litre of jet fuel = 0.7 kg.

residents[2], or to the annual emissions of the entire population of major European cities such as Lisbon, Manchester, Hanover, Genoa or The Hague.

The billion-dollar luxury aircraft business

While the popularity of private aviation is growing rapidly among a small elite who can afford this extremely costly and polluting luxury, the market for the required aeroplanes is also growing steadily. According to industry insiders, the global market for business jets is expected to grow from 28.33 billion USD in 2021 to 40.67 billion USD by 2030.

Sales of private jets are expected to reach an all-time high in 2023, according to a new study. The report, compiled by the US think-tank Institute for Policy Studies and the US group Patriotic Millionaires, shows that the global fleet of private jets has more than doubled in the last two decades and that private aviation reached a new global peak last year, with 5.3 million private flights worldwide in 2022. With these staggering figures, private aviation in 2022 even surpassed its previous peak in flight numbers of 2007, before the financial crisis of 08/09 and the subsequent global recession. The study further states that there has been a 133 per cent increase in the size of the world fleet over the last two decades, from 9,895 private aircraft in 2000 to 23,133 in mid-2022.

To meet this ever-increasing demand for climate-damaging private flights, more and more private aircraft are needed. As a result, private aircraft manufacturing is a highly lucrative market. The General Aviation Manufacturers Association (GAMA), the umbrella organisation for aircraft manufacturers outside the commercial airline industry, has 31 member companies producing aircraft for sport, private and business aviation.[3]

According to GAMA, major private aircraft manufacturers delivered 2,818 aircraft worldwide in 2022, with a total value of USD 22.9 billion - 712 of which were designated business jets.[4] Over the last ten years (2012-2022), the industry reports the addition of some 26,800 aircraft to the global private aviation fleet, of which about 7,700 have been designated business jets. The total value of private aircraft delivered during this period is estimated by the industry at approximately 241 billion USD.

A green(washed) future?

The private aviation industry is trying to make its wasteful and climate-damaging footprint appear as small as possible. While greenwashing is increasingly becoming a staple of the commercial airline industry's marketing and communications strategies, the private aviation industry is also attempting to wrap itself in a cloak of green. Europe's largest private jet sales event and industry show, EBACE, organised by the lobby group European Business Aviation Association (EBAA) and its North American counterpart NBAA, has also adopted the theme of sustainability for 2023. However, instead of discussing the excessive carbon footprint of the private aviation industry, the organisers rely on a mixture of non systemic half-

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[2] CO_2 emissions (metric tons per capita) for the EU, 6,1T in 2019,
Source: https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=EU

[3] General aviation is defined as civilian, non-commercial flight, it includes sport aviation, business travel, humanitarian aid etc. It does not include military aviation or commercial, scheduled airline aviation.

[4] The GAMA data presented here includes piston aircraft, turboprops and business aircraft. Source GAMA, 2022 yearbook. Although piston aircraft - usually very small aircraft - are mainly used for sports or special missions, their use in business or private aviation cannot be ruled out. Both jets and turboprops are used to varying degrees in business and private aviation. The European Business Aviation Association (EBAA) includes in its industry data a wide range of different aircraft types used in private and business aviation (including turboprops and jets alike). All the aircraft types mentioned and analysed here are used for private or business flights; commercial scheduled aircraft are not included.

measures, such as eliminating disposable drink bottles, using on site EV transport or carbon offsetting, and inflated technological promises.

The following is a critical examination of the industry's most common illusory or inflated solutions.

What is greenwashing?

Greenwashing is a PR tactic that is used to make a company or product appear environmentally or climate friendly without meaningfully reducing its environmental impact. The Cambridge Dictionary definition of the verb 'greenwash' is "to make people believe that your company is doing more to protect the environment than it really is". In line with this, the promotion of false solutions, the financial sponsorship of climate initiatives such as the global climate conference, as well as over-emphasising and advertising of 'green' actions, is defined in this report as greenwashing.

What is a false solution?

A 'false' solution is a climate solution presented by governments or companies that has either proven to be actively harmful to the planet and/or communities, or is so severely under-researched or developed at such a small scale that it cannot be seen as a substantial alternative that will lead to significant reductions in GHG emissions. This includes carbon offsetting, agrofuels, fuels made from waste or large battery-electric planes.

More fuel-efficient planes are not a false solution as such, but they will never be sufficient to achieve decarbonisation of the sector, especially as long as there is no demand reduction.

Fossil fuel substitutes / "Sustainable Aviation Fuel"

So-called Sustainable Aviation Fuel (SAF) is an umbrella term for a variety of relatively new types of jet fuel intended to replace fossil fuel based kerosene.

Certain fuels produced from renewable electricity (e-kerosene and potentially green hydrogen) could allow the industry to reduce greenhouse gas emissions over the long term for those drastically reduced and remaining flights that cannot be avoided or shifted to rail. Hydrogen is currently produced mainly from fossil materials; the widespread deployment of fuels produced from renewable electricity will take time, and there will inevitably be increasing competition for these fuels with other sectors such as the steel industry. Fuel based on biomass or waste is either non-sustainable or unavailable in sufficient quantities that would make a difference to decarbonising aviation.

Before the COVID pandemic, less than 200,000 tonnes of "sustainable aviation fuel" were produced globally, a tiny fraction even of the 300 million tonnes of jet fuel needed by commercial airlines in an average year. The International Energy Agency (IEA) expects that so-called SAF will make up 19% of airline fuels by 2040, meaning that 81% will still be fossil-fuel based kerosene. This projected development of so-called SAF is clearly not ambitious enough to bring even commercial aviation in line with the Paris Agreement. The new ReFuelEU law sees very optimistic so-called SAF mandates, but fails to point out where all the renewable energy should come from and includes only a "minimum share of the most modern and environmentally-friendly synthetic fuels"

Despite these limitations, together with carbon offsetting, so-called SAF is the most popular 'strategy' for the aviation industry – both commercial airlines and private aviation – to reduce emissions in the long-term and its promotion is often used by companies to appear 'green'. However, the industry lacks the short-term strategies that are needed to reduce aviation's climate impact in line with the Paris Climate targets over the next eight years.

The private aviation industry is particularly interested in the use of so-called SAFs. The reasons are obvious: as a capital-intensive industry with an extremely wealthy and privileged clientele, the financial capacity to purchase the very expensive new fuels is large and the potential benefit for the public image of private jets is high. According to a recent study, the median net worth of a full and fractional private jet owner is $190 million and $140 million respectively.

However, the benefits of this development should be challenged. Given the ease with which most private flights can be substituted, the scarce, costly and energy-intensive so-called SAFs should be used where there is truly no substitute for flights and where they must continue to provide real societal value. In addition, increasing competition for the limited availability of so-called SAF as a commodity threatens to artificially drive up prices and slow the decarbonisation of some unavoidable commercial flights.

Types of so-called SAF

- **Agrofuels made from plants** (typically from oilseed): Globally, the most popular oil used for agrofuels is palm oil. However, the use of palm oil for agrofuels is highly problematic for the climate and the environment. Palm oil is mainly produced on plantations in tropical rain forest areas such as Indonesia and Malaysia which are associated with deforestation and devastating impacts on biodiversity as well as food security, human rights, and access to drinking water. Palm oil is by far the worst agrofuel in terms of environmental destruction, but similar problems are linked with soy oil from the Amazon. Healthy ecosystems, access to land, sufficient food supply and the livelihoods of the local population are under threat as a case study on refinery currently under construction in Paraguay to primarily produce aviation agrofuels (for 100% export) shows. But even the production of European oilseed is associated with negative ecological impacts, mainly because its production consumes a lot of energy and entails a high demand for agricultural land that could otherwise be used to produce food for people. The land-use for domestically produced agrofuel will therefore lead to higher imports of other agricultural products from overseas, often associated with deforestation.

- **Agrofuels made from waste**: The easiest waste to transform into kerosene-like fuel are used plant oils from kitchens. While this could be an ecological option, the quantities of used cooking oil will never be sufficient to become the main energy source for the whole aviation sector. For example, in Germany only around 250,000 tonnes of natural oil and fat waste are generated per year, equal to around 3% of the country's annual kerosene consumption. As the biggest share of used cooking oil is already used to produce agro-Diesel for road transport, its potential for aviation is even further limited. The rising demand for used cooking oil for agrofuels in Europe also leads to imports from outside Europe, which increases the risk for use of virgin oils (like palm oil) in exporting countries Another potential source for waste based agrofuels are animal fats from beef production, which can lead to expansion of the beef industry and exacerbating serious social and environmental impacts already linked to this industry.

- **E-kerosene (or Power-to-Liquid)**: E-kerosene is synthetic kerosene made from electricity and a carbon source, e.g. CO_2 and/or carbon-containing waste, which can be used in existing planes and with existing plane technologies. E-kerosene is one of the few alternative fuels that can be produced in a relatively eco-friendly way. For this to happen, however, the electricity must come from 100% renewable sources (sun, wind, geothermal energy, etc.) – and this is not a done deal at this stage. Scaling up production is possible, but requires a significant investment in the production of green electricity as well as in the research and development of this technology. There is also competition with other sectors for renewable electricity and, even in the most optimistic scenario for the development of e-kerosene for aviation, it will be necessary to reduce air traffic to bring the sector in line with the Paris Agreement. If all jet fuel used today was to be replaced with e-kerosene, that would require two and a half times the renewable electricity currently (2019) available globally. Because all other modes of transport are more energy efficient, as many flights as possible must be shifted to other public transport such as trains. This applies in particular to extremely inefficient private flights, which are 5 to 14 times more polluting (per person / per kilometre) than scheduled flights. E-kerosene is currently only available in tiny quantities and at high prices. The first and only global commercial e-kerosene production site in Germany currently operates at a capacity of 25,000 litres per year, equivalent to just 0.00004% of the total annual jet fuel demand in the EU.

Green hydrogen: As with e-kerosene, green hydrogen must be produced from 100% renewable electricity in order to be sustainable – and this is far from being the case at the moment. No carbon source is needed to produce green hydrogen. The big disadvantage of green hydrogen is that there are no commercially available aircrafts that can be operated with it yet. The development of new plane technology based on hydrogen will take decades – far too long to achieve full decarbonisation of aviation by 2040. As with e-kerosene, there is also competition with other sectors for renewable electricity. Additionally European countries would rely heavily on production in Global South countries to satisfy their demand for green hydrogen. This paves the way for neocolonial dependencies and is heavily pushed by fossil corporates (especially the gas lobby).

Electric aviation

The dream of electrifying air transport is not new, but there are major technological and societal hurdles that make widespread deployment of these technologies almost impossible in the near future.

Experts have warned that electrically powered civil aviation over relevant distances would only be feasible with a significant increase in battery-specific energy and fundamental changes in operations. Even with major advances in battery technology, experts believe that electric aircraft will be limited to short- and medium-range flights, but not to long-haul flights over oceans or between distant cities. And even for smaller, lighter machines, where electrification seems easiest to implement, it's true that they will only become carbon neutral if the electricity is sourced sustainably. Again, the question is whether this form of using renewable electricity is the best use of this limited resource, which is urgently needed to decarbonise many areas of life.

At the same time, analysis by industry insiders shows that for the foreseeable future the private aircraft sector will be dominated by medium to heavy aircraft types - aircraft types for which the transition to electric propulsion is still a distant dream, if indeed it can be achieved at all. Even very optimistic studies suggest that large all-electric commercial aircraft may not be viable until the middle to end of the century, too late to have a significant impact on the decarbonization needs of the industry. And this only takes into account the technical feasibility of battery developments and technological solutions, not the energy sources, battery production or their respective environmental and social impacts.

eVTOLs (Electrical Vertical Take-off and Landing)

As part of the electrification of aviation, the potential market for electric air taxis is drawing a lot of attention. Also at EBACE they have a prominent place, e.g. in several talks and panels of their "sustainability summit". The problem with eVTOL is that it's by far the most inefficient way to travel electrically. E.G. in comparison to electric ground transport modes such as rail, coach or even car. The potentially limited payload and range capabilities of eVTOL will confine them to very short trips only and they won't contribute to effective decarbonisation of the major aviation markets. Their high demand for batteries will again compete with other sectors needs for this scarce resource.

Finally eVTOLs will most likely be extremely expensive and therefore limited to serve the transport of a tiny wealthy elite.

Carbon offsetting

Carbon offsets are when a polluter that has emitted greenhouse gases exchanges or 'offsets' their pollution with a 'credit' for a supposed carbon captured by someone else. It is a licence to keep polluting in exchange for carbon credits from e.g. tree planting or nature conservation projects that promise to save emissions in the future. However, research has shown that most of these projects do not actually lead to any savings in emissions.[5] Carbon offsets are unjust as they justify high emissions from a wealthy minority, while grabbing resources that are essential to the majority, like land for growing food or restoring biodiversity.

When the aviation industry relies on offsets for their emissions they are in fact not reducing emissions or changing the damaging impact of their emissions caused by the burning of fossil jet fuel in the atmosphere. Instead, the money for offsetting flows into projects that may or may not save emissions at some point in the future. An investigation by Unearthed-Greenpeace has shown that many large European airlines are supporting offsetting projects that were "saving" forests that weren't really under threat, or investing in schemes that are not even expected to last long enough to effectively offset the emissions created by fossil fuels. Some forest protection schemes were even directly run by logging companies which had built roads through rainforests. Against this backdrop, the reliability of carbon offsetting schemes used by the private aviation industry also remains questionable.

Net-zero carbon neutrality VS real-zero reduction of air traffic

The private aviation industry has committed to carbon-neutrality (or "net-zero") by 2050. This sounds good but carbon-neutrality does not mean that the industry will fully phase-out fossil fuels by then. The industry only plans for a 50% carbon reduction compared to a (much lower than today) 2005 baseline. For the remainder of their emissions they plan to buy carbon offsetting certificates. Real-zero decarbonisation means reducing and stopping emissions. It means full speed ahead towards effective regulations that set limits on polluting modes of transport, a decrease in demand for transport, a real prioritisation of climate-friendly modes of transport and the transformation of the transport system into one that consumes less energy and uses 100% renewable sources.

A climate-safe plan for aviation by 2040 will require a ban on private aviation and other replaceable flights, a reduction of air traffic, and the use of fuels from 100% renewable energy for the remaining air traffic.

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[5] Öko-Institut investigated 5,000 CO_2 compensation projects for the European Commission in 2017. Only 2% of these projects actually lead to reduced CO_2 emissions.

Or https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe