

Flight shame: Flying less plays a small but positive part in tackling climate change

October 25 2019, by Jan Ditzen and Erkal Ersoy



Credit: Nils Nedel/Unsplash., FAL

"Flyskam"—the Swedish word for "flight shame"—describes a phenomenon that [has taken off](#) around the world, as travelers face growing pressure to reduce their carbon emissions by switching to alternative modes of transport. Climate activists [have denounced air travel](#), settling for boats, trains or, at a pinch, paying to [offset the carbon emissions](#) from their flights. Celebrities [face criticism](#) for flying by private jet—and Germany's Green Party has even put forward plans to

[ban domestic flights](#) within the country.

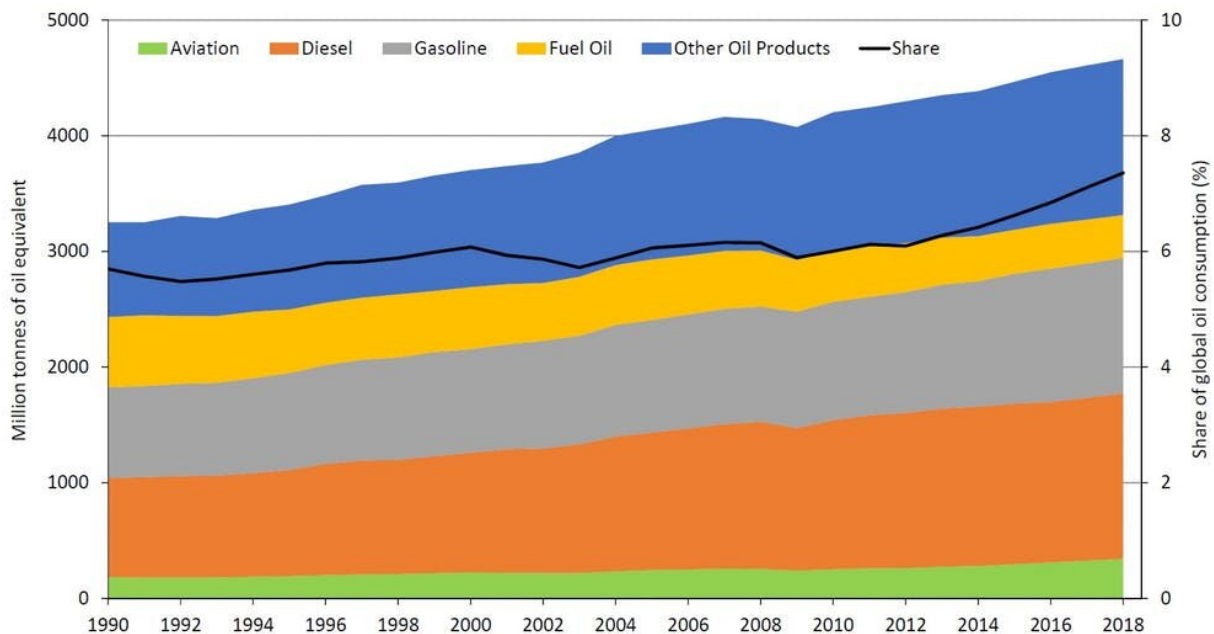
Yet according to our calculations based on the the [BP Statistical Review of World Energy 2019](#) (which we both contributed to), CO₂ emissions from [aviation](#) fuels account for a mere 3 percent of global CO₂ emissions and 8 percent of worldwide oil consumption. This may not sound like much, but in the past 30 years, aviation [fuel consumption](#) has almost doubled, consistently contributing to the growth in global oil consumption.

To see whether the efforts of individuals to cut down on [air travel](#) can make a meaningful difference to global emissions, we took a closer look at how fuel consumption by the [aviation industry](#) has changed over time, and what trends are set to take hold in the future.

Fuelling demand

A common way of estimating CO₂ emissions for individual passengers is to take the aircraft type and distance travelled into account. This is the method used by carbon offsetting organization [atmosfair](#), and the International Civil Aviation Organisation's [carbon footprint calculator](#).

By contrast, our approach to quantifying CO₂ emissions from flights involves looking at the consumption of aviation fuel. This eliminates the need to rely on estimates of passenger numbers, aircraft type and how full or empty planes are, and can easily be compared to other means of transportation.



Global oil consumption by fuel type. Consumption measured in million tonnes of oil equivalent (mtoe) on the left axis, and share of aviation in global oil consumption on the right axis. Credit: Jan Ditzen, Author provided

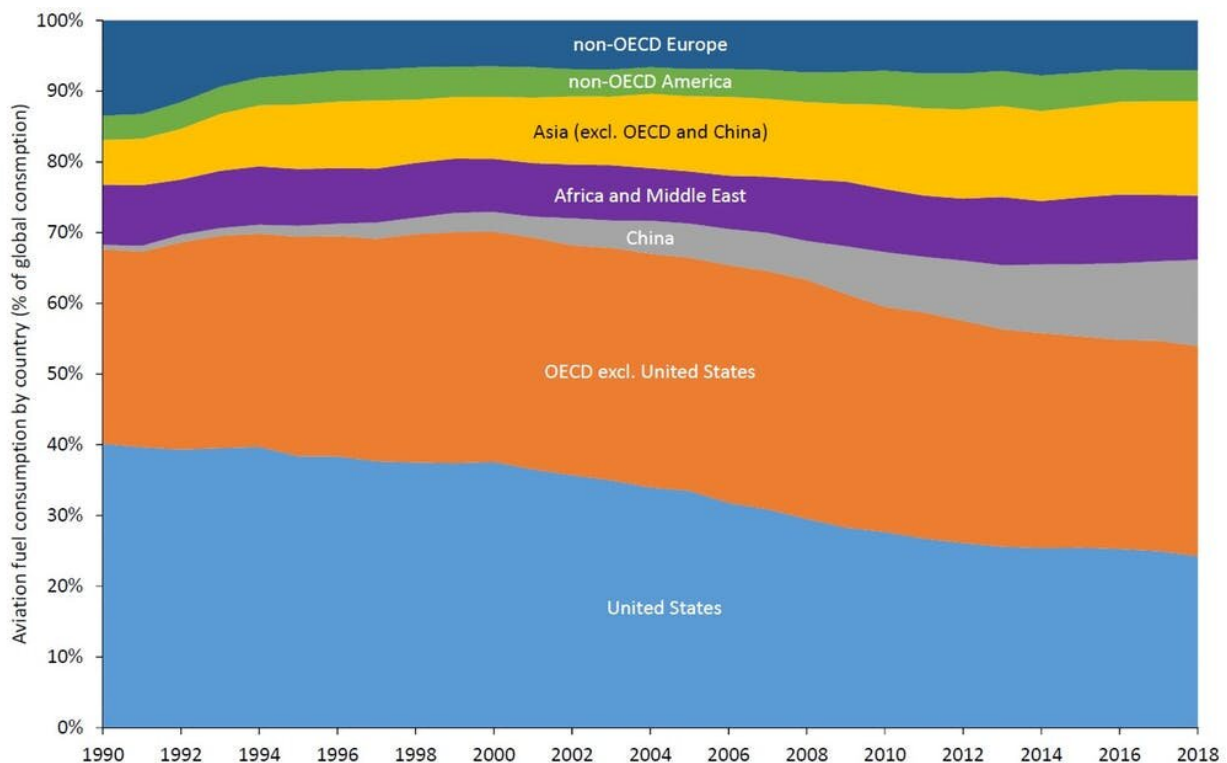
An important caveat is that our method ignores the effects of condensation trails or nitrogen oxides (NO_x) emitted by planes. Including these in the estimates is challenging because their effects only last for a matter of minutes, hours or days. But [research suggests](#) that the warming effects of aviation can be much larger, depending on where in the atmosphere NO_x are emitted. So our approach only gives a conservative estimate of the emissions from aviation.

The figure above shows global oil consumption, measured in million tons of oil equivalent (mtoe). Over the past 30 years oil consumption has risen continuously, amounting to a 50 percent increase since 1990. Over the same period consumption of aviation fuel almost doubled from 185 mtoe to 343 mtoe.

Compared to other means of transportation, such as road and rail, aviation accounts for a relatively small but growing percentage of oil consumption. In 2018, aviation [was a major driver](#) of the 1.2 percent global increase in oil consumption.

Global growth

A large share of aviation fuels are consumed in developed countries. In 2018 the US alone accounted for more than 20 percent of aviation fuel consumption. In the same year half of all aviation fuel consumption took place in OECD countries—a club of mostly developed countries [which represent about 15 percent of world population](#).



Aviation fuel consumption by country. Credit: Jan Ditzen, Author provided

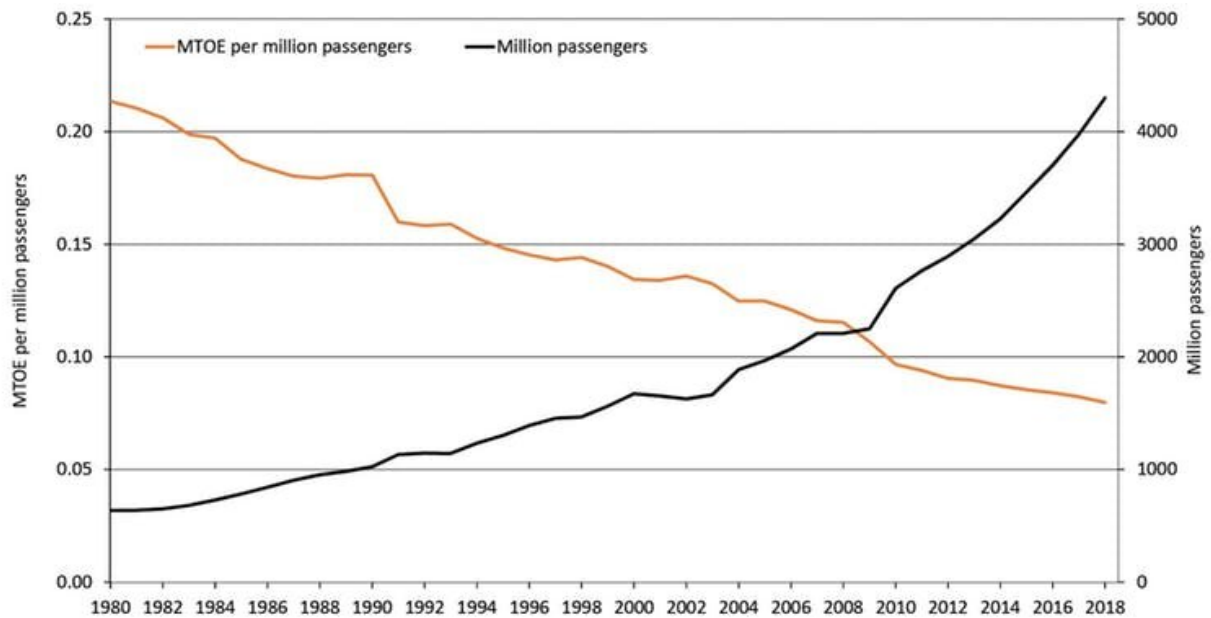
Meanwhile, China, Russia and non-OECD countries in Europe and Asia, which account for almost 60 percent of world population, consumed 32 percent of all aviation fuels. Given that the populations of these countries [are forecast](#) to grow, we can expect air travel passenger numbers to increase. In fact the International Air Transport Association estimates that [China will replace the US](#) as the biggest aviation market by the mid-2020s.

To put things into perspective, if China, Russia, non-OECD Europe and the rest of Asia were to fly as much as the OECD countries, total aviation fuel consumption would almost triple from its current level of 343 mtoe to about 935 mtoe. It would further increase to 1,560 mtoe, if the entire world flew as much as OECD countries. This amounts to more than the current global consumption of gasoline and diesel.

It's worth noting that consumption is normally attributed to the country that represents the "point of sale": for example, if a Norwegian plane refuels in Iceland en route to the US, this counts as Icelandic consumption and emissions. This matters, because any attempts by individual countries to tax aviation fuel would be unlikely to succeed, since planes would simply go out of their way to refuel in low-tax countries, meaning a transnational policy is required.

Future efficiency

Since 2000 the number of air passengers has almost tripled, reaching a new high of [4.3 billion in 2018](#). The main driver of growth is budget airlines, which offer primarily short and medium-haul flights in the American and European markets.



Passenger numbers and fuel efficiency over time. Fuel efficiency in MTOE per million passengers on the left axis, million passengers on the right axis. Credit: Jan Ditzen, Author provided

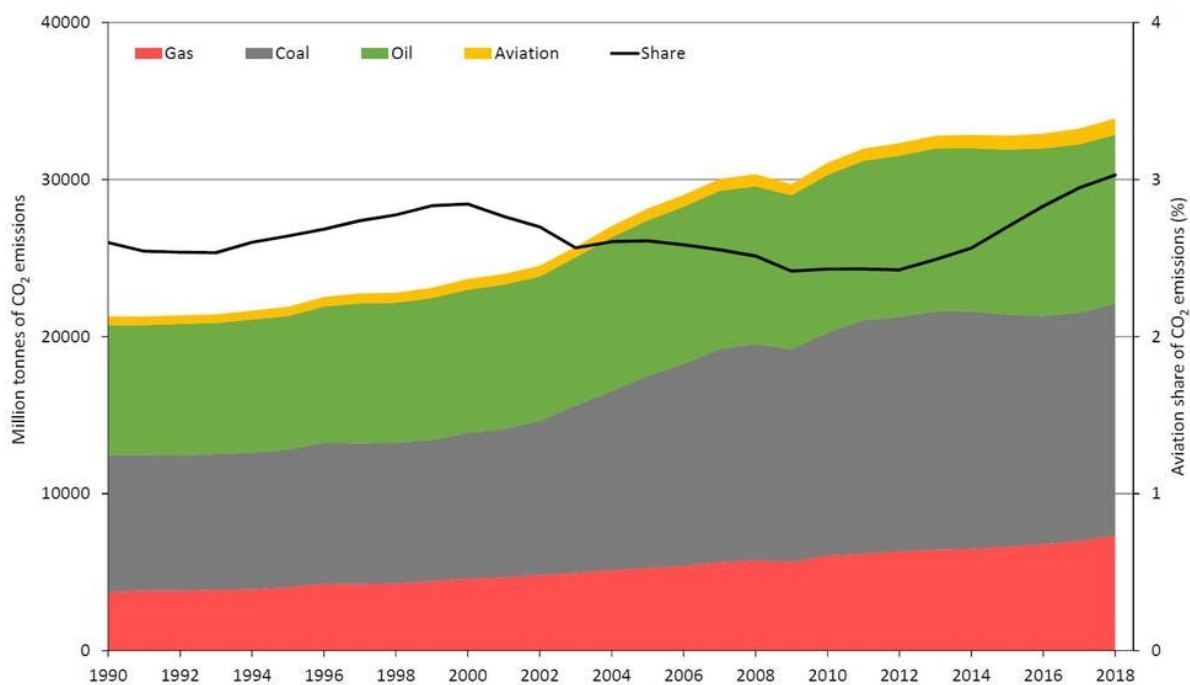
It's not all bad, though. As shown in the figure above, the amount of fuel required per passenger has decreased steadily over the years, although the rate seems to have slowed after 2010, despite the introduction of [more fuel-efficient planes](#). The IPCC estimates that [18 percent of CO₂ emissions](#) from planes can be saved, if air traffic control management and other operational procedures become more efficient.

Based on current information it still seems the increase in passenger numbers is likely to outstrip the increase in fuel efficiency, leading to an increase in overall fuel [consumption](#).

A greener alternative

Low-carbon sustainable aviation fuels can reduce CO₂ emissions, although only [six airports in the world](#) (Bergen, Brisbane, Los Angeles, Oslo, San Francisco and Stockholm) offer them on a regular basis. The [International Energy Agency \(IEA\) estimates](#) that, in 2018, sustainable [aviation fuels](#) only accounted for 0.1 percent of aviation [fuel](#) production—so much more could be done to promote their use around the world.

In 2018, passenger planes emitted around 960m tonnes of CO₂, representing 8.5 percent of emissions from oil products and less than 3 percent of CO₂ from all fossil fuels—leaving other oil products and coal as the main sources of emissions.



CO₂ emissions by fuel type. Emissions on the left axis and contribution of aviation to global emissions (in %) on the right axis. Credit: Jan Ditzen, Author provided

But the fact remains that alternative means of travel, especially trains, have a much better carbon footprint than flying. The [London North Eastern Railway](#) estimates that it takes about 17kg of CO₂ per passenger to travel from Edinburgh to London, which equates to heating the [average UK home](#) for two days. [Atmosfair](#) estimates the same journey by plane would produce 145kg of CO₂ – equivalent to heating a home for 22 days.

In wealthy nations across the Western world, where people can choose to take alternative transport over short and medium distances at little to no extra cost, "flyskam" may well have its place. But when it comes to tackling climate change, flying less is small piece in a big puzzle.

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