

# Jet Zero and the politics of the technofix

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**Special Investigation: It's not 'Jet Zero.' It's not even net zero. It's plane insanity - and we're heading for a hard landing.**

In the brave new geography of heat domes, torrential floods and woodland infernos, old-style climate denialism is as good as dead. From the ashes, we see its resurrection in new, sustainable-branded forms.

Nowhere is this more apparent than in the UK Government's Jet Zero consultation, due to conclude next month. The wager is that aviation can be massively expanded even as its greenhouse gas (GHG) emissions taper to zero.

In researching this essay, we read the government's [Jet Zero documents](#) and interviewed aviation industry insiders and spokespeople. We found that of the three key terms—jet, zero, and consultation—two are misleading to the point of outright deception.

## **A very particular consultation**

What struck us first is the scope of the so-called consultation that informed the Jet Zero documents. It has centred on a wilfully naïve borrowing of promises from the aviation sector, in particular the industry organisation [Sustainable Aviation](#), mediated through [government-industry partnership bodies](#).

Largely frozen out are climate scientists and the environmental groups and NGOs that seek to protect the interests of Earth and its inhabitants. The government has even ignored a key recommendation of its own advisory body, the [Climate Change Committee](#) (CCC), that continued expansion of the aviation industry is, under *all* scenarios of technological advance, incompatible with its 2050 net zero target.

The aviation industry's principal goal, its own continued growth, has been adopted by the government as its own. Aviation expansion is fundamental to Britain's future, declared the Aviation Minister, Liz Sugg, in the 2018 report on *The Future of UK Aviation*. Airport expansion, stated a follow-up report in 2020, is indispensable to the government's agenda of "global connectivity."

The same document projects that by 2050, passenger miles flown will be twice the 2017 figure and six times the 1990 figure, while aviation GHG emissions in the period from 2017 to 2050 will remain constant.

Even if the latter projection holds good (and we show below that it can't), then, by the government's own admission, aviation will comprise fully a quarter of Britain's greenhouse gas emissions by 2050 and will be the industry with the greatest carbon emissions. The subtext is clear: aviation expansion is non-negotiable, environmental concerns are an add-on.

*We need an ecologically sustainable restructuring of our transportation infrastructure as a matter of urgency.*

## Obscuring the clouds

We are sceptical of Jet Zero's calculations and give reasons below, but one general point should be made right away. Their focus is overwhelmingly on aviation CO<sub>2</sub>. The latest research, however, provides further evidence that two-thirds of aviation's global-heating impact stems from non-CO<sub>2</sub> emissions and cloud formation - such as contrail cirrus. For aviation's *actual* impact, take the CO<sub>2</sub> figure and multiply by three.

To put it in perspective, a return flight from London to New York, generating one tonne of CO<sub>2</sub> per passenger on average, has an actual impact equivalent to three tonnes. According to the CCC, three tonnes is the total annual level of per capita emissions that Britain must be restricted to by the mid-2030s, if the 1.5C target is to remain even possible.

Or consider military aviation. Officially, it accounts for fully one third of all emissions on the British government's tab, but when non-CO<sub>2</sub> effects are factored in, that proportion rises sharply.

In the rest of this essay we introduce the government's plans, identify their miscalculations, and demonstrate the limitations of relying on techno-fixes. We conclude by adding to the growing calls for demand management of aviation as well as a just and ecologically sustainable restructuring of our transportation infrastructure as a matter of urgency.

## The plan

The Jet Zero projection for aviation CO2 emissions is an increase over the next decade from 37 million tonnes (Mt) in 2019 to 39 Mt in 2030, before a decline to 21 Mt in 2050. At that point, aviation will be ‘net zero’—assuming that those 21 Mt are captured and stored, or offset. That the chosen target dates, 2040 and 2050 for domestic and international aviation respectively, are far beyond the lifespan of the current government is significant.

The methods proposed to achieve decarbonisation are overwhelmingly technological. As spelled out by [Grant Shapps](#), the transport secretary, the focus will be on “biofuels and electric aircraft.”

The model for aviation is the electric vehicles (EVs) strategy for road transport: a ‘business as usual’ approach that assumes ever-growing sales, little or no demand management, and a high-stakes gamble on technology.

In road transport, the plan is fraught with [problems](#), not least the emissions from the extraction and the manufacturing processes, as well as the scarcity of wind and solar power. In this context, replacing all vehicles with EVs risks exceeding the global carbon budget. But while decarbonising road transport is deeply problematic, it is technically feasible. Adopting a similar strategy for aviation is not simply problematic, it is, at least for the foreseeable future, delusional.

### **Taxis in the air**

Electric planes, according to Shapps, offer “[boundless possibilities](#)”. What Shapps and Jet Zero fail to mention is that due to [the weight of batteries](#) - which, unlike fuel, don’t burn off as you fly - electric flights will only be viable for short journeys with few passengers. The maximum range even of the tiny five and nine seater planes projected by two of the leading electric aircraft companies, [Lillium](#) and [Eviation](#), is 800km – less than the 900km from London to Berlin - and neither of them is yet commercially operational.

[Even in the aviation industry](#), the consensus is that we’re unlikely to see electric flights at 1,500km or longer, yet these journeys make up [80 percent of aviation emissions](#). In other words, electric planes are a substitute not for jet planes but for buses and trains. They’d be no more than an airborne taxi service: good news for the wealthy hoping to avoid congested roads and trains but with no positive effect on the lives of the majority, or on carbon emissions.

### **H is for hot air**

Another technofix offered by the Jet Zero consultation is [hydrogen flight](#). Hydrogen doesn’t suffer from the problematically low energy density by mass of lithium batteries, but because its energy density by volume is far lower than jet fuel it requires much bigger and heavier onboard storage tanks. Hydrogen planes would also require very extensive modifications to airport infrastructure.

The source of hydrogen is another concern. Only one percent is currently ‘green’ - i.e. produced with renewable energy. It is over thrice the price of ‘grey’ hydrogen, which itself is [four times](#) as expensive as kerosene.

Grey hydrogen is produced from fossil fuels, with CO<sub>2</sub> released as a waste gas—around [830 million tonnes](#) each year. If those emissions are captured, the hydrogen is known as ‘blue’. A [recent study](#) warns that blue hydrogen could be worse for the climate even than burning fossil gas, due to [methane loss](#) during its production plus the high energy inputs—still, typically, from fossil fuels.

The hydrogen hype is pushed by fossil-fuel companies, fearful that their assets will become stranded. The dubious actors behind this technofix have been [cooking the books](#) on which the government’s aviation calculations rely, and appear determined to exaggerate any positive potential of hydrogen.

In short, hydrogen offers no realistic alternative to kerosene in the near to medium future, and [aviation insiders](#) know this. Willie Walsh, until recently CEO of International Airlines Group, admits that, [even in the 2030s](#), no long-haul hydrogen flights will be possible. Their more substantial hopes, which have been carried over into the Jet Zero agenda, are tied to sustainable aviation fuel (SAF).

## Fields of fuel

SAF can be grouped into two types, biofuel and synthetic [electrofuel](#). Both carry significant problems.

Commercially available SAFs are mostly ‘hydroprocessed esters and fatty acids’ (HEFA) derived from agricultural crops such as palm oil or from waste products such as used cooking oil.

The best-known HEFA-using aviation entrepreneur was Richard Branson, in the mid-2000s. To burnish his image as an eco-conscious businessman - and therefore one who could supposedly be entrusted to run airlines in the age of climate crisis - he arranged for coconut oil to part-fuel a flight from London Heathrow to Amsterdam.

Technically, the mission was accomplished. But the sustainability implications were troubling. To have fuelled that short hop with 100 percent coconut oil would have required [three million coconuts](#). The entire global crop would supply Heathrow for only a few weeks—and it’s one of 18,000 commercial airports worldwide. Following this stunt, coconut oil was never used in a Virgin flight again.

SAFs continue to be held up by industry and governments alike, including in the Jet Zero plan, as central to aviation decarbonisation.

But, energy crops such as palm oil (or coconuts) are not sustainable in any reasonable definition of the term. For energy production they’re a sub-par use of land: solar panels convert solar energy for human-use much more efficiently.

In competing with agricultural crops, their [downsides are legion](#). They contribute to GHG emissions from land-use change, and to land-ownership concentration; they cause food price rises, food insecurity, deforestation, peat burning, water shortages, and biodiversity loss. One such example – in 2019 alone the palm oil suppliers to Neste, the world’s largest biofuel producer, [were accused](#) of deforesting at least 10,000 hectares and setting 13,000 forest fires.

Biofuel crops produce GHG emissions [in other ways too](#). Their inputs include large quantities of energy and fertilisers, a major source of nitrous oxide, as well as [hydrogen](#) - largely from fossil gas - for the hydrotreatment of oils. Biomass from plantation-grown trees is seen by many in the aviation industry as the new cornucopia, but it suffers from all the same drawbacks.

### **Pollution into fuel: is there a catch?**

For sustainable fuel, attention has therefore shifted to other sources. One is CO<sub>2</sub> extracted from the air by [Direct Air Capture](#) technologies and converted into SAF. This may offer potential in the [distant future](#) but currently is far too expensive at £900 per tonne of CO<sub>2</sub> and produces fuel at around four times the price of conventional fuels. The process is also energy intensive. If all current (pre-Covid) flights were powered by synthetic fuels, they “[would consume more energy](#) than the world’s total electricity generation from renewable sources today”.

Other sources include forestry residues - such as bark, branches, and sapling thinnings, municipal and business waste, and industrial offgases.

Forestry residues are not a serious alternative. They compete with more pressing uses: decarbonising electric power, fuelling ground transport, and Bioenergy with Carbon Capture and Storage (BECCS). Waste and offgases, however, look potentially promising. We contacted two leading firms in these sectors, Velocys and LanzaTech, to ask for detail.

### **Velocys**

Of the 27 million tonnes of waste collected annually by Britain’s councils and businesses, Velocys’ representative told us, much consists of water, and recyclable substances such as metals and “inerts.” These are removed. The remainder is heated using the [Fischer-Tropsch](#) process. Contaminant gases are washed out and what remains, chiefly hydrogen and carbon monoxide, is converted to SAF.

The [Fischer-Tropsch](#) technology is thoroughly proven—it’s of 1920s vintage. But can Velocys use it to produce *sustainable* fuel, in sufficient quantities, and in time to achieve the government’s Net Zero target? We doubt it.

First, the product, jet fuel, is very expensive to produce, and competes with other more pressing needs such as diesel for [buses](#) or trucks.

Second, there isn't remotely enough of it. Even if Velocys were to collect *all* of Britain's municipal and business waste, the annual yield would be only two million to three million tonnes of SAF. UK-departing flights already require 15 million tonnes each year.

Third, as with synthetic e-fuels, the energy requirements are prohibitive. Renewable energy supply is far lower than is widely supposed. Together, wind and solar provide only [three percent](#) of the world's energy supply, and the [overall renewable energy investment total](#) has been flat since 2015.

Finally, Velocys, like most alternative SAF projects, has not demonstrated commercial-scale viability and there are strong grounds for scepticism. American bioenergy company [Solena](#) went bust in 2017 having failed in a similar project. According to [recent research](#) by [Andrew Rollinson](#), most large-scale commercial gasification plants fail. The technology, he notes, "has high risks associated with multiple pathways for fire, explosion, and the release of environmental toxins".

Regarding Velocys' proposed first commercial plant in Britain, at Immingham, its representative admits: "We have yet to raise the construction capital. It takes many years to develop these sorts of projects. The engineering required is considerable, plus there are all sorts of commercial constraints." If everything goes quickly and smoothly it could be functional "in the mid-2020s." Don't hold your breath.

## **LanzaTech**

LanzaTech's core technology is ingenious: [Clostridium](#) bacteria that combines carbon monoxide and hydrogen to form ethanol, for conversion into jet fuel.

Its ideal locations are blast furnaces, the offgases of which include carbon monoxide and hydrogen. LanzaTech expects its facility adjoining the Port Talbot steelworks to yield 80,000 tonnes of fuel annually.

So far, so impressive. But let's maintain perspective. Those 80,000 tonnes, LanzaTech UK's managing director Jim Woodger tells us, represent "0.6 percent of UK jet fuel usage." As steel production itself [shifts from fossil fuels](#) in pursuit of *its* net zero goals, the supply of those offgases will dwindle. And when LanzaTech looks beyond steel, they find feedstocks containing less or no hydrogen, which must then be manufactured. They are looking at DAC to SAF projects but here again the energy needs, says Woodger, are "very large" and the bottleneck is "the availability of renewable electricity."

Other possible feedstocks include forestry waste, as discussed above. They also include sources of 'second-generation bioethanol,' such as straw. But these too face many competing uses, the available quantities are low (Woodger estimates enough to supply at most "two or three" facilities of similar size to the Port Talbot plant in the

UK) and the jet fuel would be expensive—perhaps two to four times dearer than kerosene.

As with Velocys, production can't be scaled up at will. "It takes three years, realistically, to do an overall project," says Woodger, and only then can you transfer efficiency improvements to future projects. LanzaTech's CEO, [Jennifer Holmgren](#), has noted that using recycled CO2 or CO costs far more than refining oil, and bringing the cost curve down could take "30 or 40 years."

The wider aviation industry knows that synthetic fuels cannot be ramped up quickly. The Sustainable Aviation group [admits that](#) in Britain a production level of 600 kt of SAF won't be achieved until the mid-2030s at the earliest.

Even the lowest usage scenario it envisages "would exceed globally available waste oils and fats" and would require "substantial new volumes of oil crops." These would likely include palm oil—or, in order to evade regulation, its derivative known as [Palm Fatty Acid Distillate](#). In both cases, it's utterly unsustainable, and a green light for the chainsaws and bulldozers.

### **An interim conclusion**

As a means for Britain to achieve its climate targets, electric and hydrogen aircraft, we have shown, are white elephants. As to biofuels, they are burned, producing CO2 and other GHGs as well as creating a host of other problems. Alternative SAFs are speculative and prohibitively expensive. To put it generously, they're over-hyped. What of the three remaining cards in the Jet Zero pack: efficiency, carbon capture and storage (CCS), and offsets? And if Jet Zero is scrapped, what are the alternatives?

**We turn to these topics in *Part 2*, to be published at *The Ecologist* on Monday.**

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<https://theecologist.org/2021/aug/31/jet-zero-one-way-ticket-climate-hell>

# **Jet Zero: a one way ticket to climate hell**

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Jet Zero is a charade, driven by considerations of profit, economic growth and aviation's corporate consumers.

We discussed the latest concoctions in the aviation industry's recipe book for climate inaction, as outlined in the British government's Jet Zero plans: zero emissions flights and

sustainable aviation fuels (SAF) in *Part One of this article*. Today we review Jet Zero's other offerings: fuel efficiency and 'offsetting and removal'.

Finding them to be over-hyped, and often socially and environmentally toxic, we ask why this is, and we look at the politics of the aviation technofix, before presenting sustainable and socially equitable long-distance travel alternatives.

### The last gasp of fuel efficiency

The UK Government's *Jet Zero* report predicts that efficiency improvements will account for the largest share - a quarter to a third - of aviation carbon savings by 2050. Alas, this forecast is based on wishful thinking, with no historical empirical evidence to support it. Efficiency savings over the last 50 years have **increased at most by an average of one percent per annum (pa)**, and they **stalled from 1995 to 2005**.

Even **the International Civil Aviation Organisation** projects 1.37 percent pa as the most optimistic long-term projection of fuel efficiency. The 1.4 percent pa efficiency gain on which *Jet Zero* relies, Finlay Asher, a former aircraft engine designer at Rolls Royce, told us, is "wildly optimistic."

***Offsetting is an outright scam. That it is accorded a prominent role in Jet Zero - indeed any role - is a scandal.***

There are "no large step-changes in efficiency around the corner and it takes 10-15 years to certify a significant new aircraft and engine design. So, anything we do see in 2035 - e.g. new designs entering service - will not be the predominant aircraft in service in 2050, due to the 20-30 year lifetime of aircraft."

A deeper problem with efficiency improvements are their rebound effects. Improvements reduce costs which spur demand, leading to more miles flown. Historically, the global aviation industry has grown at approximately three percent pa, far exceeding the efficiency gains of about one percent. According to the Climate Change Committee (CCC), if demand is not constrained, Britain's aviation industry will grow at an average rate of over two percent pa over the next few decades. Earth's systems care little that less kerosene is required per passenger if more in total is being burnt due to air travel's overall growth.

### The agenda of capturing

Let us assume for a moment that our scepticism toward *Jet Zero*'s favoured technofixes is unfounded. Even then, its calculations require that, by 2050, 21 Mt CO<sub>2</sub> must be removed annually if aviation is to meet the net zero target. The Sustainable Aviation group projects that at least 26 Mt CO<sub>2</sub> will have to be "**offset or removed**" each year. The CCC, meanwhile, estimates that aviation will require two-fifths of Britain's negative emissions reductions by 2050.

It takes a peculiarly entitled elitism to propose that aviation emissions—a luxury pollution 50 percent of which is occasioned by one percent **of the world's population**—would be a worthy recipient of fully two-fifths of Britain's investment in these speculative technologies. In addition to such ethical questions, empirical concerns abound regarding the **storage capacity** for CCS, and the yawning gap between **the miniscule scale** of currently **monitored and verified** carbon removal and the colossal scale required for the *Jet Zero* sums to add up. Current CCS projects are **not fulfilling their promise**.



While funding, **especially from the polluting industries**, must urgently be ploughed into CCS research and trials, we should recognise that its purpose, as too-often presented today, is **a technofix** geared to short-circuiting difficult politico-economic decisions and supporting fossil-fuel giants. As the MIT Technology Review observes, CCS risks becoming **a dangerous distraction** from the need to reduce emissions.

### Offsets and other offences

The solutions discussed so far are over-hyped in the *Jet Zero* programme, with a blasé disregard for scarcities, realistic timescales, and other obstacles. But all are based on technologies that do or may one day function. The final one, **offsetting**, is an outright scam. That it is accorded a prominent role in *Jet Zero* - indeed any role - is a scandal.

Offsetting is the right to pollute in one location purchased by certificates declaring its reduction in another, relative to 'business as usual.' If a factory poisoning a Malaysian river reduces its pollution ahead of a regulatory deadline, that shouldn't give a factory in Liverpool licence to add mercury to the Mersey, to give a hypothetical equivalent. (Or, if you prefer: that the child next door is completing her potty training shouldn't give me permission to keep shitting on your doorstep each morning.)

The offset hopes of *Jet Zero* and Sustainable Aviation are mostly pinned on trees. We can agree: trees should return. Half of them - **three trillion** - have been removed by humans; a better balance should be restored. Yet there are caveats. Trees are not **interchangeable** units. Old forest is a complex ecosystem with dense understories; it cannot be '**replaced**' by plantation silviculture.

And people inhabit the places where aviation firms wish to site plantations. What of their fields, livestock, and lives? Bioenergy with carbon capture and storage (BECCS) would have to grab an area one or two **times the size of India** to achieve a 50 percent chance of staying below 2C. Offsetting through afforestation could **threaten food security**, if global agriculture is not radically reformed.

Offsets, in Sustainable Aviation's definition, are processes that ensure **a permanent reduction of emissions that cannot be reversed**. Frankly, this is a con. Afforestation is a moment within the carbon cycle in which reversal is *guaranteed*—when the trees die and rot, or burn. This summer has seen the forestry offsets of blue-chip corporations **go up in smoke**. The ideology of offsetting ought to go the same way.

### Technology fetishism

Passing through London Gatwick last year, we noticed that it markets itself as "carbon neutral." The claim rests on a mix of greenwash and accountancy smoke-and-mirrors, but it draws from a broader techno-utopian *Zeitgeist*: planes can fly by magic, thanks to technologies that enable business as usual to continue even as we successfully mitigate climate change.



The *Jet Zero* plans are concocted from the same froth. They are a wager on new technologies, many of which don't yet exist, and may well be unscalable. They combine flimsy promises from the aviation industry, in its attempt to pre-empt government intervention, with empty bluster from government, seeking to assuage a climate-concerned electorate. Its function is a smokescreen, designed to linger until this government is out of office, leaving its successors - not to mention humans and other fauna and flora - to face the heat.

### Snake oil and greased palms

Why is the government doing this, and, thus far, getting away with it? One factor is a compliant media, much of which acts as useful idiot to the aviation industry, cheerleaders of corporate press releases. A recent example is the discussion of supersonic travel by the BBC's [Evan Davis](#). The proposed SAF-fuelled supersonic flights of Boom Technology Inc. augurs an age of "guilt-free" aviation, gushed Davis - erasing any concerns regarding Boom planes' [far higher fuel consumption](#) per passenger or indeed the litany of SAF-related obstacles discussed above.

As to the government's motivations, we could begin with Grant Shapps, the transport secretary and the policymaker responsible for *Jet Zero*, who, thanks to [dodgy donations](#) and [unscrupulous](#) business activities, earned enough to join a select club of ultra-high-polluters: private jet owners.

His ministerial colleagues, meanwhile, have been suckling from the teats of [oil companies](#), [airports](#), [petrostates](#), and [climate denialist individuals and thinktanks](#). This is a government that has consistently [served the oil industry](#) and is [resistant to climate action](#). Yet to win votes from climate-anxious voters, a green façade is essential. A trumpeting of technofixes, while heels are dragged on most other fronts, aims to square the circle.

In this approach, the Johnson government is no outlier. *Jet Zero* may be a charade, driven by considerations of profit, economic growth and aviation consumers - largely business executives and frequent fliers, and not those of people and planet, but it's in keeping with the global script. Policies are built around speculative technologies as if they are facts in waiting. US climate ambassador John Kerry recently [revealed](#) that *half* of the reductions required to reach net zero by 2050, if his preferred pathway is followed, will "come from technologies we *don't yet have*."

The Paris Agreement, similarly, was built on [technology fetishism](#), with its gamble on an untried technology, BECCS. Since then, BECCS has been substantially [discredited](#) and quietly dropped as the lynchpin of climate policy, only for new technofixes to spring up in its place. Techno-utopian fantasy continues to write the official lines. The result is complacency, a diversion of attention from the practical changes needed *right now*.

## Absolute Zero

If the habitability of this planet were the driving concern, *Jet Zero* would emphasise 2025 and 2030 targets, **not 2050**. It would ban private jets, press the MoD to shut down military aviation, remove the aviation fuel tax exception, ban aviation advertising, cancel airport expansion plans, and take immediate measures to reduce passenger numbers.

It would prioritise consultations with the under-25s, environmentalists, and scientists. And it would take seriously the **Absolute Zero** report from the **FIRES** research group. If the British economy is to hit net zero by mid-century, the FIRES engineers have shown, the aviation industry “faces rapid contraction”, with “all aviation activity phased out within 30 years,” all British airports except Glasgow and Heathrow shut down by 2030, and Heathrow too by 2050 - and only then, *if* the technologies and sufficient renewable electricity come onstream, could some reopening begin. Drastic and urgent action, it recognises, is required if the aviation industry is to reach net zero in the required timeframe. We cannot negotiate with the planet, or hoodwink it with offsets.

## Alternatives

Restricting aviation demand does not mean banning the annual bucket- and-spade holiday. In Britain **15 percent of the population** take 70 percent of the flights, and in any given year 50 percent don't fly at all. The average income of the 15 percent is £115,000 while the 50 percent are overwhelmingly working class.

Nationally and globally, it's the rich who fly most. **Introducing a frequent flyer levy**, for example, would not penalise the once-a-year holiday in the sun. Instead, it is a fair way of taxing environmental damage and equitably restricting demand. Most business communications can be conducted online - indeed, **Covid 19 has exposed business travel's great unspoken truth**: much of it has nothing to do with business.

Some form of rationing will be needed, but it must be linked to progressive reform on other fronts. For instance, **Jonathan Neale** proposes, those taking a long-haul flight should be constrained to stay abroad for at least a month, but with employers obliged by law to permit lengthy vacations to accommodate this. Likewise, if government forced employers to be flexible, slow-moving **zero-emission ships** could offer an alternative for some long-distance journeys.

The case for aviation contraction won't be a vote winner unless linked to proposals that address popular concerns. If campaigners are to bring the aviation industry back down to earth, the vision must be of a habitable planet and of appealing travel alternatives.

To replace short-haul flights, trains, and electrified coaches - perhaps hooked to overhead power lines along motorways - should be subsidised, reliable, accessible and affordable for all - or even free.

**Surveys consistently demonstrate** that people prefer train journeys to flying. Where trains offer a viable alternative, such as between London and Paris, we see passenger demand for aviation collapsing. While possibly suffering from a similar strain of techno-utopianism to that challenged in these articles, **dirigibles** offer an additional low emissions alternative to aeroplanes. Governments should **revive night trains**. Cruising at a modest 125 mph, a train from London could, with stops, easily reach Barcelona in eight hours, Moscow in twenty.

All these initiatives would create new jobs, for which workers departing the aviation industry should, in a **just transition**, be given priority.

## Conclusion

To prevent **a Hothouse Earth** and the bleakest dystopias of climate chaos and species extinction, the fossil fuel economy must be rapidly shut down from both ends: supply and demand. In its place we need an economy that operates safely within planetary boundaries while also providing "**a good life for all**".

Our critique of *Jet Zero* is not opposing investment in new technologies such as synthetic fuel, CCS or DAC. But if these remain essentially technofixes, neon green fig leaves to conceal the continuation of an insupportable 'business as usual' and to boost profit margins in polluting industries, they'll be worse than superfluous.

As it stands, the airlines, hand in glove with government, are using these "solutions" to carve out space for an expansion of their operations. The aviation industry cannot be given free rein to grow based on false promises. Instead, it must be scaled down, and allowed to re-grow only if the life cycle of aircraft can be designed to avoid GHG emissions entirely.

As the **IPCC** recently stated, "rapid, far-reaching and unprecedented" change is required across all areas of society. *Jet Zero* is ignoring this advice, we must not.

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