

VIDEOS

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Does aviation have a place in a low-carbon world ?

By **Kevin Anderson** (Researcher in environment sciences) 20 March 2018

Aviation now accounts for nearly 3% of global CO₂ emissions, roughly the same amount as produced by the UK. This trend, driven mainly by frequent, wealthy flyers, is set to continue, and will only lead to an environmental dead-end. What could be the alternatives ? Professor Kevin Anderson explains.

The emissions from our flying, from aviation, represent about 2-3% of global carbon dioxide emissions. Now, that does not sound like a lot of emissions, but that's roughly the emissions from California, or the emissions from the UK, or the emissions from Germany or the emissions from Beijing and Shanghai together. So 2-3% is a very large proportion of the emissions, but what is most disturbing is it is growing very fast. Generally, the emissions from aviation grow faster than average economic growth, and we've also started to see that in other parts of the world, they are starting to fly like we do. We must bear in mind that most people do not fly around the planet. [For] the largest proportion of the population, the only plane they ever see is going overhead. They have never been on a plane, and will very unlikely ever go on a plane in their lives. So flying is still something that is only carried out, even within the wealthier countries, by a relatively small group of people. And the growth in aviation across the EU for instance is not driven by poorer people going on their one holiday a year, it's driven by frequent flyers, generally relatively wealthy people, who fly very regularly. And I can see that with my colleagues and people who I communicate with, and friends and families and so forth, who fly now very regularly.

The consequences of "business as usual": an environmental dead-end

So aviation is a really big issue. Firstly, it is a significant proportion of emissions now. Secondly, it's growing very rapidly, and thirdly, there are no low-carbon opportunities for changing aviation to something else, so either fuel or electric planes. There's nothing out there that is going to work significantly in the coming 20 years, if not a little bit longer. So over that period, what is going to happen with aviation if we carry on like we are now is we're going to build more airports, more runways, and we will be flying more, and we'll be locking ourselves, locking our communities, our societies into very

...the remaining emissions, reducing our communities, our economies and very high levels of emissions from aviation, and there is no way out of that. This is a very difficult situation. Unlike, say, if you deal with cars or electricity use, there are things that you can do [that] in aviation we cannot, at least not in the timeframe that we have to deal with climate change, and so we come down to the real big issue where we have to use demand management.

Reducing aviation use: a difficult pill to swallow

We have to manage how much we fly. Now, that is very unpopular. There is also a great belief by governments—though very little evidence—that suggests that aviation is a major driver of the economy. Now, this may have been the case in the past, and it may well be that in some parts of the world, that can still be the case, but often actually now with more mature economies, it is not the case that aviation is a big driver of their economies. It may be an important part, but there are many other factors, or many other ways that they could be doing what they do without the use of aviation. And some of the more progressive companies are already thinking like that because it is so expensive to have their workers flying around the world, which is very unproductive for meetings when there are alternative techniques for doing that.

Alternatives to aviation exist

But even when it then comes to things like holidays, within Europe, a lot of us travel across Europe when we could be going by train, but we often still fly. So I'm here at the moment at a climate change conference, and the first English person I spoke to flew here from Bristol in the UK to Paris. Now he could have got a train in a very short period of time. So there is the train service [that's] improving across Europe, and we should be making sure that it is now a very viable alternative to aviation. So there are ways that we can travel quite reasonable distances across Europe, quite quickly. They're still going to take a little bit longer than flying, but they can be made comfortable, we can arrange for night trains, which have already been reduced now across Europe, which is a real problem. So we need to make sure we have more night trains, comfortable trains, that we can eat on the trains, and make travel much more attractive, and we can use that as a way of getting ourselves across Europe. And we can travel from the UK to the south of Spain or the south of France very quickly now.

Aviation cannot be part of a low-carbon future

So there are ways that we can substitute aviation for other forms of travel, but if we expect aviation to become low-carbon, then that's not going to happen. And aviation, as it is today, and as it will be tomorrow and for the next 10 or 20 years, cannot be part of a low-carbon future. We should not be having any growth in aviation in the wealthy parts of the world from now. And in the poorer parts of the world, their aviation should only grow very slowly for really essential activities, not for the sorts of things that we are now using aviation for. So the message is much more severe than in other areas. If we are serious about climate change, if we want to avoid the dangerous implications of climate

change, then we have to significantly control the level of emissions from our aviation, and that means [we have to] cut back on the growth in aviation, or in fact reduce our levels of using aircraft in the wealthier parts of the world, and ensure we have very low growth in aviation in the wealthier parts of the world. This is not a comfortable message. No one really wants to hear this: governments or the public, or in businesses, or academics who spend half their time flying round the world to conferences. We have to find alternative ways of doing these things, because aviation will not be low-carbon in the next 10, 20, even probably 30 years. So if we are serious about climate change, when it comes to aviation, "business as usual" clearly is not an option. We have to move away from that.

The green aviation myth

The industry itself, and indeed a lot of politicians and some other people, will talk about green aviation, and what they talk about there, is improvements in efficiency. Now as an engineer, who has previously worked on jet engines, mostly on oilrigs and on power stations, and not so much on planes, but they're the same engines... Very good engineers have worked on these engines for years. They are very, very efficient. To make jet engines more efficient now is very difficult. We can improve them by maybe 0,5% every year, occasionally we might get 1%, but each year, it's more difficult to get an improvement in efficiency. We can make the plane, the body of the plane, slightly more efficient. We can make the chairs a little bit lighter. We can put more price barriers to stop people bringing more luggage, but even when you do all of these things, all you can do is improve the efficiency of the planes by maybe 1%, at the most 2% every single year, and this is what we've seen historically. But if your growth in aviation is 5% every year, and your improvement is only 2%, then overall, your emissions are going to go up by 3% every single year, and this is what we've seen. So although the planes today are much more efficient than they were five years ago, and they're much more efficient than they were 30 years ago, the emissions from aviation keep on rising, and that's because efficiency cannot keep up with the increase in demand. So there is not such a thing as green aviation. You cannot make the planes sufficiently efficient to overcome the demand for increased aviation. So in the end, you have no option but to go for one of planned decline, where we have to cut back on the amount of aviation that we are using, and find alternative ways. As I said, that is not at the moment an immediately popular message, but it is the only message that fits with our commitments on climate change.

The only technical alternative: biofuel?

The only technical alternative to significantly reduce emissions that has been discussed is the use of biofuel, so growing a crop and then using that to make fuel that we can then put into planes. There's been a lot of work on this, and there are some very slow improvements. So we already see in cars across Europe, about 5-7% of the fuel that we buy when we buy normal petrol or diesel is actually biofuel. So there is talk about "Can we use that for aviation?" Now,

obviously aviation is an industry where safety is very, very important, so trying to introduce a new fuel always takes a long time because you want to make sure and check that it works properly. If your car breaks down because the fuel goes a bit solid because it's a cold day, that's not a problem: you pull in at the side of the road, you get someone to fix it. If you are at 32,000 feet—or whatever the metric version might be, a few thousand metres—in the atmosphere, in the air, and [in] your plane engines, the fuel starts to go solid, then you have real problems. So quite rightly, the safety part of the aviation industry means that any new fuel takes a long time to be tested and tried, and [to] make it into the system, but in addition to that, we are still a long way off getting the technology for this fuel to be reliable.

A naive solution

And then, the other problem is that many other sectors want to use biofuel. So every sector I talk to now: the shipping sector thinks it will use biofuel, the aviation sector thinks it will use biofuel, the car sector thinks it's going to use biofuel. We're going to use biofuel in power stations. We're already using that in the UK: we are importing wood from America, and burning it in old coal-fired power stations. So everyone expects to be using biofuel. At the same time, we are expecting to be feeding 7-9 billion people on a planet with a changing climate. There is a very naive view that we have this planet that is infinitely large, that we can grow as much food and as much biofuel as we want. And when you look at that, it looks like we will not be able to have enough land to be able to grow what everyone anticipates that we're going to need. So every sector thinks it is the most important sector, so it should get the biofuel, and aviation says this, [i.e.] that it should have really whatever new fuels come along that are suitable for aviation. Aviation should have that, but shipping says "Well, it's much more important for the economy, so surely shipping should have it", and the car sector says the same thing, and the power sector is saying the same thing. So every sector thinks it is the most important one. And when you add this all up, it doesn't make any sense. So the only alternative for aviation, which is biofuel, in the sort of 20-year timeframe (that) is still very problematic. And this is the problem, [i.e.] that we do not have a really available, ready technical alternative to aviation, other than finding alternative ways of travelling by using IT, virtual conferencing, or by using fast trains.

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