HOUSE OF COMMONS

Transport Committee

Oral evidence: Airlines and airports: supporting recovery of the UK aviation sector, HC 683

Wednesday 1 December 2021

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Watch the meeting

Members present: Huw Merriman (Chair); Mr Ben Bradshaw; Ruth Cadbury; Simon Jupp; Karl McCartney; Grahame Morris; Gavin Newlands; Greg Smith.

Questions 215–252

Witnesses

II: Helena Bennett, Senior Policy Adviser, Green Alliance; Cait Hewitt, Policy Director, Aviation Environment Federation; and Dr Andy Jefferson, Programme Director, Sustainable Aviation.

Written evidence from witnesses:

- Aviation Environment Federation
- Sustainable Aviation
- Green Alliance

Examination of witnesses

Witnesses: Helena Bennett, Cait Hewitt and Dr Jefferson.

Q215 **Chair:** We will now load up our second panel. Good morning. We are delighted to be joined by three representatives from the sustainable aviation sector. I will ask each of them to introduce themselves for the record.

Helena Bennett: Good morning, everyone. My name is Helena. I am a senior policy adviser at Green Alliance, which is an environmental think-tank and NGO based in London. We work across UK domestic climate and environmental policy.

Cait Hewitt: I am Cait Hewitt, policy director at the Aviation Environment Federation. We are a not-for-profit organisation campaigning on aviation's impact for people and the environment.

Dr Jefferson: Good morning, Chair and Committee. It is great to be with you. I am Andy Jefferson, an independent consultant contracted in as the programme director of Sustainable Aviation. Sustainable Aviation is a UK coalition of the aviation industry in the UK, representing 36 different members. You have just heard from Loganair and AGS, who are both members of Sustainable Aviation.

Q216 **Chair:** Thank you, and good morning to all three of you. We have an hour with you and lots of questions. I will start with the Jet Zero Council. It last met in July this year. The consultation ended in autumn. What steps has the Jet Zero Council taken, in your view, towards its aim of delivering zero-emission transatlantic flight within a generation? That is quite a boast. How effective do you think it has been so far? Cait, shall we start with you?

Cait Hewitt: First of all, it is important to remind ourselves that the Jet Zero Council is an entirely different initiative from what the Government call their jet zero strategy. Jet zero has become just a sort of aspiration or branding that the Government like to put on anything to do with aviation and climate change.

AEF's director has a seat on the Jet Zero Council. We are glad to be there. The reason for our participation is that while the Jet Zero Council is very much about technology and fuel development, and a conversation between Government and the industry about how to speed up some of the low-carbon and zero-carbon developments that could theoretically be possible, there is a policy component to that, in making these things happen and bringing them to market. There is probably going to be a need for policy alongside that. AEF is there in that capacity.

It may be early days to judge what the council has achieved. There have certainly been lots of meetings and activity, particularly of the sub-groups that go alongside the main council. At best, I think the council could help to increase ambition and, hopefully, unlock some of the barriers to the

revolutionary technologies that we will need in order to achieve net-zero aviation by 2050. At worst, there is a risk that it could create the impression of activity and of the Government doing things about the issue, even though the reality is that many of these solutions are likely to remain small scale, at least this side of 2050.

We need to be careful to make sure that we are not blinded by the kind of techno fantasy that can come out of some of these conversations, when the majority of the industry is likely to continue using kerosene for a long time to come. That is why it is important that the council sits alongside a really strong policy framework. I am sure we will talk about that during this session.

Q217 **Chair:** Did you say that you had actually attended the Jet Zero Council meetings? There have been three.

Cait Hewitt: AEF's director, Tim Johnson, has attended those meetings. I have attended one of the sub-group sessions.

Q218 **Chair:** As you say, there is the jet zero strategy that runs alongside this, and it has five key areas that are being consulted on. The Jet Zero Council has five core objectives. How do those two matters align, or do they seem to be completely separate? It is a bit confusing.

Cait Hewitt: It is confusing. I do not know. I cannot speak in detail to the core areas that the Jet Zero Council is working on. As I say, the council is set up as a very technology focused body, trying to deliver, as you said, the kind of aspiration that came directly from the Prime Minister of being able to deliver a net-zero flight across the Atlantic within a generation.

Actually delivering decarbonisation of the entire sector is a very different challenge. The two things can complement each other, but certainly our view as an organisation is that delivering net-zero aviation will not be possible to do purely through some of these new technologies. There will need to be other measures alongside that.

Q219 **Chair:** Such as what, briefly? I want to bring the others in.

Cait Hewitt: We think that you cannot have unlimited passenger demand. Realistically, to get from where we are now—2019 having recorded the highest-ever level of aviation emissions from flights departing the UK—to net zero emissions by 2050, within 30 years, it would be reckless to assume that the technologies are going to come along at the right scale and quickly enough for us to feel that we can just carry on flying in the way we were pre-pandemic. We think that there is a need to think about how we remain connected globally and within the UK with less flying.

The other key component, which is not directly part of the Jet Zero Council but is an important technology development, is around carbon capture and storage. All the models from Sustainable Aviation, the

Department for Transport or the Climate Change Committee, and the visions for decarbonising aviation, rely very heavily on the use of permanent greenhouse gas removal from the atmosphere in order to balance what they all anticipate to be ongoing aviation emissions by 2050. That is a really important area and, at the moment, we do not know how it is going to be delivered, who is going to pay for it and all that kind of thing. That needs to be—

Q220 **Chair:** Cait, I'm sorry to interrupt you there but, first, I have not brought the other witnesses in and, secondly, I gave you the invitation and you have, rightly, cantered across the brief. The ideas you have are all our sections. That was my fault. I just couldn't resist asking you the "such as" question.

Helena, let's come to you and focus purely on the Jet Zero Council. What is your involvement and what are your thoughts as to whether this is an effective model to help us get to net zero in aviation?

Helena Bennett: Green Alliance is not involved at all in the Jet Zero Council or any of the working groups because it is an industry/Government relations body, as Cait highlighted. To be honest, I would echo pretty much everything Cait said, especially to reiterate the point about needing the policy levers that go alongside the industry and market-based solutions that the Jet Zero Council is trying to push forward.

Although it is not a group that looks at policy levers, currently the solutions that the council and industry are putting forward for both SAF and zero-emission aircraft are not substantial enough to cover and encourage the right amount of R&D, expansion and rapid uptake of the technologies that they are trying to achieve. In addition, the funding that the council is putting forward for some of those technologies is nowhere near enough. An example would be the zero-emission aircraft. One of the previous panel raised the hypothecation of APD or a new environmental tax for aviation to encourage investment and uptake of these technologies. That is an example of a policy that would need to go alongside what the Jet Zero Council is doing to encourage the industry to make a more rapid shift.

There are things such as what you were hearing in the previous panel about making some of the PSO routes mandatory zero-emission flights by, for example, 2035. That would be a really good idea. Even encouraging things like having all domestic flights covered by zero-emission aircraft in 2040 is an example of a policy that needs to come alongside what the Jet Zero Council is doing, to encourage uptake of technologies, otherwise it will be too cumbersome and not move fast enough.

Q221 **Chair:** Indeed. Some of the points you mentioned are indeed in the jet zero strategy, which, as we have established, is separate from the Jet Zero Council.

Andy, you advise Sustainable Aviation with regard to their work programme. What are your thoughts on the progress so far of the Jet Zero Council?

Dr Jefferson: First, Huw, let's celebrate success where we have it. It is great that we have the body in place. As we have recognised in the work we are doing in Sustainable Aviation, net-zero aviation by 2050 is achievable. We have set out a plan that shows how we can get there through improved operational efficiencies, and through the introduction of new hydrogen/electrical aircraft, as well as replacement of the current aircraft with the new ones available in the market today, then switching to sustainable aviation fuels and finally through the carbon offset areas. That will get us to net zero as an industry.

The Jet Zero Council is a coalition of industry and Government working together and other interested parties. When I look at the challenge of how you deliver sustainable aviation and, certainly in this regard, get to net zero, it has to be about collaboration and working together, and accepting that it is a hard challenge, but it is a doable and achievable challenge. I think that is the work that the Jet Zero Council needs to focus on.

As an example of where I think we could do better going forward, it has taken seven years of discussion between industry and Government to get to the point of having a consultation about a sustainable aviation fuel mandate. That is too long. We need to accelerate that if we are to deliver sustainable aviation fuel as a technology solution. I accept the challenges, if you like, as both Cait and Helena have said, around whether we are being overly optimistic on technology. We do not think we are as an industry. We think it is achievable, but there will absolutely be barriers that could delay progress. If we do not tackle those barriers, we will get into a problem that none of us wants to be in.

Chair: Thank you very much indeed for the opening. We are going to focus on three sections. We will try to keep some discipline in the sections. We have sustainable aviation technologies. We have modernising airspace. Before we do that, we will start with the feasibility of aviation net-zero targets, and I will hand over to Ruth Cadbury.

Q222 **Ruth Cadbury:** Andy, you just said that achieving net zero in aviation is dependent on certain policy levers. What do you think is needed? Which levers do you think are most needed to achieve net zero in aviation by 2050?

Dr Jefferson: Thank you very much for a very good question. There are a couple. I will look at airspace, for instance. We have been talking about modernising airspace in the UK for quite a while. It has not really been updated since the 1950s or 1960s despite an increase in traffic of over 1,000%.

There is a case that we just need to get that job done. We have structures in place through the Airspace Change Organising Group with

Government and industry, but there are still risks and hurdles. There is funding support for that that needs to be guaranteed to get the job done. We envisage that being finished by 2033. There are risks that it might not happen.

If we look at sustainable aviation fuels, we have the mandate consultation that is helpful. That talks about seeing airlines use a certain amount of sustainable aviation fuel. What we do not have yet is certainty for the people making the sustainable aviation fuel, to make it commercially viable. For example, in the US at the moment, both the Federal Government and state governments are providing incentive policies to make the sustainable aviation fuel price the same as buying fossil jet fuel.

What we are looking at in the UK is whether we can do something like we did with renewable offshore wind energy, where we introduced a policy called contracts for difference, which effectively enabled offshore wind to be provided as a solution, as part of the energy grid, at a price comparable to other sources of energy provision at the time. We are saying to Government that we need a similar mechanism in the UK. We are supporting some work to put proposals on the table for that. We need the Government to deliver on a policy solution for it by the end of next year.

The reason that is important is that without those two mechanisms in place we cannot get and secure capital investment to make sustainable aviation fuel plants here in the UK. We have three companies proactively looking at having three plants up and running by 2025, but without that policy in place they will not happen.

On the next challenge on net zero, around new aircraft technology, we have a really good aerospace growth partnership between Government and the aerospace industry in the UK, and we are quite proud of that. We have had that for nigh on 10 years. In the spending review announcement, the Government said they want to continue to support the aerospace growth partnership and what comes from the Aerospace Technology Institute and programmes like the Fly Zero Technology Programme, but they have not specified what level of funding they are going to provide for that. They have basically said that it is up to BEIS to decide how they do that.

I would describe that uncertainty as unsettling for the aerospace industry at the moment. There are risks that we could lose out from a UK point of view. While that probably will not affect the rate of technology development in the aerospace sector, it will mean that UK jobs, skills and opportunities may be lost to other parts of the globe.

Finally, on the carbon removal, carbon capture side, I agree with what Cait was saying. It is a really important area and we need to get it right. There are risks at the moment. Those risks are, effectively, a disconnect in the thinking: carbon capture and storage strategy sits within BEIS;

decarbonising transport in its broadest terms sits within DFT; and the financial support sits in Treasury and other parts of Government. Coming back very briefly to the Jet Zero Council question, there is a question about how we make sure that the right Government Departments are talking to each other through the Jet Zero Council and the messages are flowing. Sometimes, from my experience, there are disconnects, which could get in the way of accelerating progress.

Those are the broad policy benefits and opportunities that I think we need to work on going forward. Hopefully, that is useful.

Q223 **Ruth Cadbury:** Thank you. I think my question was how achievable net zero would be by 2050. Your answer seemed to suggest a lot of uncertainty and also high risk. Certainly, the pilot airspace changes that had to be abandoned a few years ago suggest a level of risk in that particular area. I am not even sure that delivers a significant proportion of carbon saving anyway.

A last question for you, Andy, is: what metrics do airlines and airports typically use to calculate how they will achieve net-zero targets? Are those metrics independently audited?

Dr Jefferson: Quickly on the airspace point, you are right in that it is a challenge. We are making progress in Scotland. NATS—the air traffic control provider in the UK—is implementing what it calls free route airspace, which allows aircraft to fly direct, or optimise flight profiles, through Scottish airspace by the end of the year. As an example, that by itself is, first, the biggest airspace change we have seen in the UK so far to date, which is great, and, secondly, in terms of carbon benefits it will save the carbon equivalent to the power used by some 3,500 family homes or the carbon footprint of about 1,000 people. It will not solve the problem overnight, but it will deliver carbon savings in the next couple of years, which is part of the journey to net zero.

The other point, about metrics, is interesting. Obviously, winding back the clock 10 years, you had companies reporting carbon footprint and gathering data for airlines for things like fuel burn, and for wider industry for energy use and other things. They were reporting that through their own processes. They tended to get it audited by companies that they paid to do auditing.

Increasingly now, though, we are seeing quite complicated and involved carbon reporting processes, with both shareholders and investors requesting that. The level of scrutiny is going up and up. There are other schemes like airport carbon accreditation schemes, and airlines increasingly reporting carbon emissions and sharing that globally. Can it be improved? Absolutely, but I would say that it has improved a lot over the last 10 years.

Q224 **Ruth Cadbury:** Thank you. Cait and Helena, you have already raised serious concerns about the achievability of net zero by 2050. Very briefly,

is there anything you want to add, particularly about the risk or likelihood, and which strategies are the most likely and the least likely to help?

Cait Hewitt: It is important to remember, for context, that while it is certainly the case that the aviation industry has made big improvements in engine and aircraft efficiency over time, nevertheless those changes have never happened quickly enough to keep up with the pace of growth of the industry. That is why, as I said, just before the pandemic, UK aviation had its highest-ever level of emissions.

The sector has not been able to make the kind of technological breakthroughs to zero carbon sources of energy that have taken place in other sectors. Therefore, the kind of stuff that we are talking about that could make a really big impact and could, in theory, get the sector to net zero by 2050 are technologies that are only just off the drawing board, to be quite honest. They are the kinds of synthetic fuels made from captured carbon from the air. Carbon capture and storage is a technology that has existed in theory for a very long time. It just has not happened. As you said, Ruth, there are big risks.

I do not know if you have come across an academic coalition called UK FIRES. What they have tried to do is make an assessment across the entire global economy—it is an ambitious project and really important—of what might be the renewable energy and carbon capture storage needs of every sector in order to deliver the global net-zero goal that we have. They have looked historically at the typical rate of technology change in countries that are committed to trying to deliver that. Their view is that it is almost impossible to continue with the kind of lifestyles we have now, and to continue with things like flying and driving at the rate that we expect to, while powering all of that with renewable electricity or using carbon capture and storage at the scale that would be needed.

It is the question about whether what we are talking about is ambitious or reckless. Julian Allwood, who represents the UK FIRES coalition, or did recently, put it this way in the press: "Look, is it really ambitious for a doctor to say to an alcoholic patient, 'You can carry on drinking because in future we should be able to develop liver repair surgery'?" We need to be really careful in making an honest appraisal of what can be done and the scale of the risks involved, and what we can do to minimise those risks through effective policy making.

Q225 **Ruth Cadbury:** Helena, what do you say? Briefly if possible, because I am being eyed by the Chair.

Helena Bennett: I echo what Andy said earlier about praising the positive. It is good that we are starting to make a little bit of progress. The jet zero strategy consultation laid out a really ambitious set of goals that we just do not think are going to come to fruition because, as Cait said, they are heavily relying on technologies that have not been properly developed or deployed or are not operational yet.

The UK has committed to reduce emissions by 78% in 2035. By that point, we will be including international aviation and shipping emissions. If you take the pathways that were presented in the jet zero strategy consultation, they are only seeing very minimal emissions reduction by 2035 compared with 2020 levels. If we are seeing 78% across the rest of the economy, is it fair that we are not seeing that in aviation?

In terms of the risk, industry and environmental groups are looking at it quite differently. Industry is thinking, "We'll develop these technologies to justify the growth in demand in aviation, and if they don't come to fruition then we won't meet net zero or we'll potentially lose our social licence, depending on how popular climate still is with the public in the future."

What we are saying is that we should not be allowing growth in aviation demand until we have a proven technology capability off the ground and in action, reducing emissions immediately. To reflect on something that Cait said, the way to reduce emissions in the next decade or 15 years is to look at passenger levels. These technologies are not going to do anything to reduce emissions in the next 10 years.

Chair: Thank you. Over to Grahame Morris on the same subject.

Q226 **Grahame Morris:** I will try to be brief. Earlier, in response to a question from one of my colleagues—I think it was Ruth Cadbury—Andy mentioned the general obstacles and barriers facing the sector. What specific decarbonisation challenges do airports face compared with airlines? I will go to Andy first, and then to Cait.

Dr Jefferson: It is an important question. Obviously, airports will be creating carbon through energy use from buildings and through emissions from vehicles on airports and through vehicles travelling to and from the airport. That is in addition to the aircraft emissions associated with flying to and from the airport.

Most airports that are involved in sustainable aviation have really good plans and strategies in place around each of those areas. All of them tend to involve the need for collaboration. A lot of those emissions sources are not directly controlled by the airport. On energy use, it is about whether you can buy green electricity for your energy use, and whether you can switch out older assets and replace them with newer ones.

One of the interesting questions for airports going forwards is, if we are going to see a switch to increased electrical and hydrogen aircraft, what kinds of requirements and facilities are needed on the ground? There is an interesting Connected Places Catapult piece of work that the Department for Transport has been co-ordinating that needs to be looked at and developed. You have a UK-wide clean energy strategy and hydrogen strategies linked to that. You have challenges around grid electricity to and from airports. All of that needs to be joined together and supported to make sure that we do not end up in a situation where

the aerospace industry has made an electric or a hydrogen plane, but there is no ability at the airport to actually charge it or fuel it. That is a really important piece of work that needs to get sorted. My sense is that quite a bit more work is required at this stage.

I want to make a really quick comment regarding previous comments about recklessness about technology and everything else. Obviously, as an industry, we do not share that view. We think that these technologies are achievable and deliverable. I would also say that we need to be careful about restricting demand for aviation in the UK. UK aviation contributes about 4% of global aviation emissions. If you put that together against global carbon emissions, at the moment we are 0.1%. If we restrict the growth of aviation in the UK, there is a question mark as to whether people will just move, and fly from different parts of the world, so you do not take carbon out of the system. You would also take the financial ability out of UK industry to take the technology products forward, which could have unintended consequences.

I appreciate what my colleagues on the panel are saying to you as evidence. Let's make sure that we understand the implications of that.

Q227 **Grahame Morris:** There was some solid evidence from the previous panel on the same issue. Cait, can I briefly go to you for your view on airports versus airlines, and how they are going to face the challenge of decarbonisation?

Cait Hewitt: I can be fairly brief. Clearly, there is a lot of work to be done on decarbonising buildings and decarbonising surface access to and from the airport for staff and passengers. Nevertheless, there probably is a much clearer pathway to delivering those kinds of changes than there is for aviation itself. That is perhaps reflected in the fact that in the Government's net zero strategy proposals for aviation they have included a suggestion that airports should be aiming for a target earlier than 2050 for decarbonisation. That is a good idea, but let's not get confused by the fact that those emissions are not typically accounted for as aviation emissions. It is a different kind of challenge that needs to be addressed.

Am I allowed to come back on Andy's point about the 4%? It is a one-liner. It may be the case that UK aviation is responsible for only 4% of emissions, but it is also the case that the UK is one of only five individual countries globally that are responsible for 4% or more of international air traffic. It is no surprise really; it just comes down to the fact that lots of different countries are going to have to be active on this issue in order to deliver aviation decarbonisation nationally, whether that is through policy measures or technology.

Q228 **Grahame Morris:** That's good. Thank you, Cait, for putting that point. Helena, I will ask you from a slightly different slant. Should airports be required to account for emissions from airlines taking off and landing from their facilities as part of their own emissions tool? Would that encourage or incentivise them to act more quickly?

Helena Bennett: I definitely think so. Some airports, to be fair, are starting to do this, whether or not it is in their official accounting. They are looking at two trajectories of their own airport emissions, but also emissions including those airlines are responsible for. It would have a massive impact on things like looking at airport expansion.

Going back quickly to the demand question, I know that Andy doesn't like it, but we see a lot of branding from airports that they are going close to net zero, and a few airports have some dates that are earlier than 2050. They will obviously have to be reviewed. Airports would then have a bit of a role to play in working more closely with airlines on how they can achieve that, whether or not it is looking at the capacity and expansion question. Going back to the technology question, it is whether or not airlines are working more closely—*[Inaudible]*

Grahame Morris: We have lost Helena.

Karl McCartney: There is only a finite amount of electricity in the world.

Chair: We were talking about the power of virtual over physical.

Q229 **Grahame Morris:** Does anybody have a dissenting view in relation to that? Andy, what incentive is there for the airports to work with airlines to encourage them to adopt greener and less polluting aircraft, more modern aircraft, that use fuel that is not quite so polluting? What is your view on counting airlines emissions in with the airport's accounting tool?

Dr Jefferson: It is a really important question and something that is worth looking at. As Helena was saying before she got cut off, a number of airports are already doing that. That is encouraging.

The challenge in regard to how effective it can be longer term is that the airports do not own the aircraft; the airlines do. They are not paying the bills for the planes; the airlines are. It is a symbiotic relationship. Airports need airlines and airlines need airports, but there is always the question of who is getting the bigger part of the financial benefits from that. Airlines and airports have argued around that for many years. I suspect they will continue to do so.

The overall benefit is that by working together, as we have seen in Sustainable Aviation, you can fast-track and accelerate solutions. That is where I would encourage the airports and the airlines to work most effectively. We all accept that we have to get to net zero. We all accept that there are solutions and that there are challenges to those solutions. As an industry, we recognise that, if we do not deliver solutions, we will be in the world of demand management and restricting growth, which we do not want to be in.

I think there is already a really strong incentive. How airports challenge airlines on that needs to be thought about in relation to what airlines are already paying for carbon. You heard from Loganair earlier about the

emissions trading scheme. That is already imposing a carbon cost for airlines. APD is effectively a cost.

Q230 **Grahame Morris:** There are carrots and sticks. There are fees and charges. They could use that method. I am conscious of time and the Chairman is looking at me. Helena, I am sorry you got cut off midstream. Would you like to finish what you were saying?

Helena Bennett: Apologies. I think my internet cut out. I was basically finished. My short answer was, yes, I think they should be including airline emissions, and I would like to see the continuation of what some airports are already doing on that front.

Grahame Morris: I see that Cait is nodding in agreement as well. As I am conscious of time, I will hand back, Chair.

Chair: Excellent. Thank you very much, Grahame. I know you have to pop off to see your cousin, so you are excused.

We are going to touch on sustainable aviation technologies, but before that we have modernising airspace with Gavin Newlands.

Q231 **Gavin Newlands:** Thank you, Chair. Andy, you touched on this a while earlier. In fact, you spoke about the progress in Scotland, as is always the way obviously, being a bit ahead of the rest of the UK on that basis. You spoke about it in basic terms. Could you explain why modernising UK airspace will support decarbonisation, and to what extent it is possible?

Dr Jefferson: Of course. Basically, when we talk about modernising airspace what we mean is this. The airspace in the UK was designed in the 1950s. If you think back to the sort of aircraft flying around then, they were propellor-generated, with very analogue systems in the cockpits, and with dials, not the TV screens that they have today, and all that sort of stuff. So much has changed in the technology on the aircraft.

At the same time, so much has also changed in the air traffic control world in what is now possible. We have virtual airport control towers managed remotely. We have much better digitalisation, or data information being shared between the aircraft flying through the sky and the air traffic controllers and radar systems. With all of that, we can now optimise the flights of each aircraft much more efficiently. If we get that right, we can certainly save carbon emissions from flights almost tomorrow, certainly in the next five years. That is what we are looking at doing. The change in Scottish airspace is the first piece of work looking at that, with the carbon savings I mentioned earlier.

The next stage is looking at the west of England and then other parts of the UK. There is also a challenge in how you link the changes that are happening higher up in the sky with the bit that is happening lower down, around where aircraft take off and land at airports. That is more complicated because you have aspects of noise and community concerns about how those changes happen. As I say, our view is let's make the

most of the opportunities and get aircraft flying as efficiently as they possibly can.

As well as the route between A and B, we are also looking at how we can avoid excessive headwinds, make the most of tailwinds and all that sort of stuff. Air traffic control is looking beyond the UK at aircraft coming in across the north Atlantic, up from Europe and managing those aircraft almost in four dimensions—the space in the sky but also in time—so that we do not have situations where aircraft have to go round in circles waiting to land and things like that. There is enormous potential, which is what we as an industry want to see implemented as soon as we can.

Q232 **Gavin Newlands:** You say enormous potential. What is the estimate? What is the range in the carbon it could save if we get it right, both at the airport level and at higher altitude?

Dr Jefferson: As an example, since 2012 alone the work that NATS has been doing has saved around 1.5 million tonnes of carbon. That is just by making tweaks and edits to the current airspace structure. The Scottish change covers 150,000 nautical miles of Scottish airspace and that is delivering carbon savings of up to 1,000 people's worth of carbon footprint a year.

Overall, in the road map work that we have done, we are looking at just over 3 million tonnes of carbon being saved by operational improvements. It is not the biggest chunk. The bigger chunks come from technology and sustainable aviation fuels, but it is a really important part because it can be delivered now while the new technologies are being developed in full.

Q233 **Gavin Newlands:** I have an airport in my constituency so I am very familiar with local consultations on airspace change. It would seem to me that this should be the easiest, and certainly by far the cheapest, method by which we can reduce carbonisation. Obviously, it will not reduce carbon as much as in other areas of aircraft technology, but it should be the most easily achievable.

Did you say 2033, and that even then we might not make it by 2033? The Government are funding this to the tune of £5.5 million at the moment, which they had to be pressured into, because airports are struggling to fund it themselves. Do we have to spend more on it to get it done quicker?

Dr Jefferson: I think the complexity will come down to how quickly the reviews of airspace can change at a lower level, and be discussed, agreed and implemented with communities and airports. They will probably take the longest, whereas with the upper airspace we can get on with the changes quicker.

It takes time to work out, "Okay, what is the change we're making?" and run that through all the safety tests and everything else that needs to be done to make sure that everybody is on board with the changes and that

they are implemented effectively. All of those processes, whether it is Scottish airspace, the west of England, the east of England or the south-east, have to be done in stages. We cannot do the whole thing at once. That is why it takes a bit of time. You are absolutely right; it is one of the cheapest and most effective ways of taking carbon out of aviation right now.

Q234 **Gavin Newlands:** Is there anything else the Government could do to speed up the process? I hear what you are saying about different areas, but could some of it not be done simultaneously?

Dr Jefferson: Let me take that one away. We can get back to you and provide evidence to the Committee on what more can be done. As you mentioned, the thing we need right now is the funding for the airspace programme. It is funded through to the end of 2022. We will certainly need additional funding to bridge through 2022 and 2023. That needs to get confirmed, shall we say, from Government.

Q235 **Gavin Newlands:** I am conscious that that was a very specific issue, and we are short on time. Cait and Helena, is there anything you want to add before we move on?

Cait Hewitt: It is important to keep in mind the scale perspective in this conversation. I believe that Sustainable Aviation's road map estimates that by 2050 we might possibly get a 4% reduction in total emissions, compared with a "do nothing" scenario, as a result of airspace modernisation. Even SA's estimates are fairly small scale, as we said.

The other thing that is really important to remember is that the whole process of airspace modernisation is fundamentally driven by the desire to increase the capacity of the airspace rather than its primarily being an environmental measure. In terms of the community opposition to some of these changes, there is absolutely a lot of community concern, as we heard from Ruth earlier, in particular about the noise impact of concentrating flights over very specific flight paths and the changes to people's day-to-day life that could have.

A lot of people will take with a pinch of salt the message that this is being done for environmental reasons when they know that their local airport wants to expand, and that through creating greater efficiencies in the sky you can potentially increase traffic. There is a risk that the overall impact on emissions could indirectly increase. In the whole package of decarbonisation, modernisation is probably going to be only a small part of that.

Q236 **Gavin Newlands:** I have one quick yes/no question for Andy. Should the Airspace Change Organising Group be on the Jet Zero Council?

Dr Jefferson: Yes.

Chair: Thank you. Let's move on to our final section, which is sustainable aviation technologies. We will start off with Greg Smith.

Q237 **Greg Smith:** Good morning, witnesses. As we look to fuelling the future of aviation, there are a number of options on the table. There is sustainable aviation fuel. There is potentially hydrogen and batteries. Even though I have seen schematics by some people in the industry that show battery power is a little bit unrealistic, given that you would require more batteries than the size of the plane to generate enough energy to get the thrust, which of those do you think we should be pursuing the most? What are the pros and cons of them? Particularly within your answer on sustainable aviation fuel, as one company flew an RAF plane on an entirely synthetically generated aviation fuel last month, can you focus your comments within that, not just on the mixed fuels but on the entirely synthetically generated fuels as the way forward? I will start with Andy.

Dr Jefferson: Thank you very much. On which technology is the most important one, our view as an industry is that they are all important. Hydrogen planes, electric planes and sustainable aviation fuels will all play a part. The reason they are all important is that they will play differing roles in the solution they provide to decarbonising aviation.

Electric aircraft will primarily operate on the shorter-haul routes, like the sub-regional routes you were talking about with the previous panel—UK domestic flying and things like that. In fact, Loganair has a project with a company called Ampaire that was flying an electric aircraft up in the Orkneys this summer.

The hydrogen side will probably come in and develop across the UK-European flight networks for the short-haul market. We are seeing some initial progress on that. There is a project called Project Fresson, which again Loganair is involved with. That is looking at hydrogen fuel cells. They were testing an aircraft with that in the summer in the highlands and islands. We have ZeroAvia in the UK, based in the Cotswolds, who are looking at getting a 19-seater hydrogen fuel cell aircraft up in the skies quite soon. They have already flown a hydrogen fuel cell six-seater aircraft. With the smaller type aircraft, by the mid-2020s, we are hoping to be at the point of them being able to enter the market and be purchased by regional airlines. On the larger scale hydrogen aircraft, Airbus is looking at ZEROe and announced a programme this year. They are looking at commercial entry into service of the 100-seater-plus hydrogen-type aircraft by the mid-2030s. That will cover the shorter-haul flying market.

With the longer-haul flying market, as you rightly said, the challenge is how you get an aircraft in the sky for seven hours-plus. You have the issue of weight; putting a lot of batteries on it will mean either having a very big plane only flying very few people, or it not working economically. What they are looking at there is drop-in sustainable aviation fuels.

Your point about pure synthetic fuels, e-fuels, is that there is a long-term goal where 100% of the fuel in the plane is made from renewable sources. Initially, in the industry, we are looking at using waste products.

A bag of landfill waste that we would throw out every week or so domestically today can be used. We can repurpose that and make air fuel from it.

The second stage, which we envisage happening in the next 10 or 15 years, is when you start to link renewable energy with green hydrogen and captured carbon, and you make a pure synthetic fuel that has zero emissions. There are projects starting to explore that already. Carbon Engineering, one of the members of SA, is looking at that and there is a project in north-east Scotland that has some interesting potential. Likewise, on waste to fuel, there are three projects, in the north-west, the north-east and south Wales, that are all looking at taking waste products and turning them into jet fuel.

We have a blend of fuel at the moment on aircraft. The first sustainable aviation fuel test flight took place in 2008. The first commercial flight was in 2018. Globally, we have now had over 300,000 flights with sustainable aviation fuels. Most of those have been a blend of fossil jet fuel with sustainable aviation fuel. The reason is that in the aerospace design systems they have designed the fuel systems and fuel tanks on the aircraft to work with the engines. They have got so good at that, based on the fact that it is using fossil jet fuel, that if we suddenly take fossil jet fuel out and put sustainable aviation fuel in, there is a risk that the systems will not work quite as well as they should. That is why we have a balanced blend.

The aerospace industry, as you saw with that SAF flight, is working very quickly to get to the point where it is 100% sustainable aviation fuels. The challenge that gives to the sustainable aviation fuel industry is that you need to make enough volume of sustainable aviation fuel to go on to all the aircraft.

Q238 **Greg Smith:** That was a really comprehensive answer. Thank you. Before we get the opinions of the other two witnesses on that, isn't that last point you made, about fuelling the engines we already have, the most critical one to get to zero emissions quicker? While innovation is exciting, sparkly and new, and creating things that will run on hydrogen and battery/electric is all very sparkly, given the test flight that Zero Petroleum did last month, straight into the existing engines and existing fuel systems of that aircraft with, as I understand it from reports, no power drop-outs and no inconsistencies or issues, surely the best way to get to zero emission quicker is by focusing on what we can put into the existing engines on aircraft as well as other modes of transport.

Dr Jefferson: I agree. Sustainable aviation fuel for long-haul flying, which represents two thirds of UK aviation carbon emissions, is the biggest area of solution that we can look at. With everything in aviation, the history of our 100 years-plus is that we need to develop multiple solutions over time, whether it is refining a propeller engine and developing a jet engine, and then refining that, as well as fuels. We need all of these things. Yes, sustainable aviation fuels will give an enormous

potential to decarbonise the long-haul flying market, which is two thirds of UK aviation emissions.

Q239 **Greg Smith:** Thank you. Could we turn to Helena and Cait, in that order? What are your views on the first question I asked, and within that can you also comment on whether you share Andy's optimism that we can be in this space by the mid-2030s to see some of these technologies in the mainstream?

Helena Bennett: I agree with Andy on the first point about the different innovations. They have different purposes, and zero-emission aircraft for much shorter-haul flights are far more realistic because of the distance they can fly. The timeline can be brought forward for those shorter flights.

On SAF—sustainable aviation fuels—Green Alliance is producing a report on the requirements in renewable energy, hydrogen and direct air capture for the production of e-kerosene and what different potential uptake rates could look like up to 2050, depending on what we think the UK grid and direct air capture sector can supply. I agree with Andy that the best way to produce it, and the only way to do it for net zero carbon emissions, is to use green hydrogen from renewable energy and direct air capture. That way there are no additional carbon emissions. There are, however, non-CO_2 effects that account for two thirds of the warming potential of aviation emissions. Transport & Environment has a really good briefing on non-CO_2 effects and potentially how to tackle them. To clarify, SAFs are not exempt from non-CO_2 effects in emissions. It is really important to raise that, so that they are not seen as a silver bullet that can just suck emissions away and we do not have to worry about them any more.

In terms of the other SAFs, we do not think that any alternative fuels should be used that come from products associated with deforestation and land degradation, which the SAF mandate consultation out in the summer clarified a bit. That was good. We know that waste-based fuels will have a limited role, but we would like to make sure that that limited role is as limited as possible. They too are not zero-carbon fuels.

We are advocating a huge uptake in the amount of e-kerosene—you might have heard of it as power to liquid or synthetic fuels—as long as it comes from renewable sources. Currently, there are absolutely no operations happening in the UK to produce it. We hope that as part of the Jet Zero Council's work, and their working group on SAFs, a rapid uptake will happen. We do not think that is going to happen, as Cait and I said right at the start, without policy levers in place. The SAF mandate is going to be really important. We are advocating within that a sub-mandate on e-kerosene to set levels up to 2050 for how much of the SAF blend should come from those synthetic fuels.

There are other considerations around SAFs, but those are the main points. The non-CO_2 effects are really important. They will help part-way

to bringing the emissions reductions that we want to see ahead of the mid-2030s, as long as the policies and regulations in place are tight and industry is incentivised to take them up. Price will be the biggest issue, we think. Renewable energy capacity is an issue and can be solved through increased capacity. Whether or not that falls on the grid and Government levels of capacity uptake is one question. This refers back to the point that Cait raised earlier about the UK FIRES research, and the amount of renewable grid capacity available. The Government are planning on scaling up by 2050, but it is not going to be enough. Perhaps a suggestion we might make is looking at how airlines and the aviation sector can add grid capacity that then feeds into the feedstock for e-kerosene.

One of the other points is about introducing taxes. Again, that was mentioned in the first panel. They could be used to help the price point of SAFs, such as the kerosene tax that we know is starting to be discussed to be introduced into the EU.

Q240 **Greg Smith:** Thank you very much. Do you share Andy's optimism that some of these can be mainstream by the mid-2030s?

Helena Bennett: If done properly, yes. I would say it is cautious optimism.

Q241 **Greg Smith:** Thank you very much. Cait.

Cait Hewitt: Shall I do that bit first? I think maybe we could get some electric and hydrogen aircraft this side of 2050. I have to say that it was only a few years ago that DFT and the CCC jointly commissioned a piece of work on exactly this kind of question about aviation technology pathways. That did not see a role for any kind of commercial use of electric or hydrogen aircraft until probably after 2050, except perhaps on a very short route.

One of the things we would like as an organisation is a fundamental look at what our aviation sector is for, what we get from it and how we might do things differently in the future. We think there is a need to do that. For example, if we had a tourism policy that encouraged people to continue to take their holidays domestically or to near European destinations, who knows, maybe some of these technologies could have a bigger role to play than they might have in the pre-pandemic scenario when, as Andy says, the very large majority of emissions from UK aviation were on flights of over 500 kilometres. I have not been on a plane for over 10 years, but if someone was to offer me and my family a flight to the south of France in a hydrogen aircraft I would probably do it.

Sustainable aviation fuel is obviously a big focus for the industry and the Government at the moment, partly because of the fact that these technology options are limited where we are today. I think there are three big challenges. I promise I will not speak for very long. The first is about scalability. At the moment, well under 0.1% of total aviation fuel

used is from an alternative fuel source. We are going from a very low baseline. If we are talking about turning waste such as chip fat into aircraft fuel, there are obvious scalability issues. We cannot power the entire UK aviation sector in this way in the future.

The second thing is cost. We need to recognise that part of the reason why these fuels have not entered the market previously is that they are much more expensive than kerosene. Maybe if we were to tax kerosene that would help to close the gap. Let's see. I thought I would get that one in before we close. The third issue is the extent to which some of these fuels really will mitigate emissions. I have to say that, given the fact of climate emergency, we need to be talking about measures that will cut CO_2 emissions today. If you take waste out of landfill and use the carbon that is currently sitting in a landfill site, turn it into fuel and then release it back into the air as CO_2, that does not meet the objective of cutting CO_2 today. We need to be very careful about what accounting we are using to justify the use of some of these fuels.

If, alternatively, we are going to do the better stuff that both Andy and Helena have talked about, where you capture CO_2 from the air and then use renewable electricity to turn it into jet fuel to cover some of the long distances, yes, that can be done in theory, but it needs an enormous amount of renewable electricity. Colleagues at Transport & Environment who are very much advocates of developing e-fuel for aviation have estimated that if you were going to power the whole of UK aviation by 2050 with e-fuel generated using electricity from offshore wind, for example, you would need to build a new offshore wind turbine every three days between now and 2050. That is just for the aviation sector. On top of that, you have the demand from every other sector in the UK economy.

There are really big challenges. It would be very useful, in things the Committee might recommend the Government to do, to look much more carefully at a joined-up, whole economy plan for what the demands are going to be from the transport sectors and the rest of the economy, both for renewable electricity and for greenhouse gas removal technologies, how feasible those are and what they are going to cost.

Greg Smith: Thank you very much. I think there are others who want to come in on this, so, mindful of time, I will relinquish.

Chair: Thank you Greg. The others are Karl McCartney and Ben Bradshaw.

Q242 **Karl McCartney:** This is probably a question for Cait and Helena first, and then maybe Andy might want to come in. Listening to some of your answers so far, I think there is a realisation that for the air industry as a whole it is going to be quite costly to achieve what you would like them to achieve. The only way they will do that is by flying people in aeroplanes and making money. In some of your answers, you seem to suggest that if they are not going to achieve that you would like to see

demand cut—that is, fewer planes flying. How do you square that circle?

Cait Hewitt: It has always been the case that airlines could have delivered these measures, and the aviation industry could have been developing some of this stuff, 10 years ago, if they were able to use the profits that they were making from a stellarly growing industry to do that. I don't think it is straightforward to say that, if people carry on flying, airlines will have enough spare money to do this stuff.

Q243 **Karl McCartney:** Is your answer to cut the number of aeroplanes that fly from the UK?

Cait Hewitt: I certainly think that continuing to facilitate, for example, airport expansion and catering for a potential growth in aviation in the future, before we know—as Helena said earlier—whether these technologies are going to be successful, deliverable at scale and all the rest of it, is hard to justify. In terms of how you deliver that, it could be through direct intervention from the Government. It could be through taxes—

Q244 **Karl McCartney:** You mean more taxpayers' money spent on the issue.

Cait Hewitt: No, sorry, I am talking about taxing aviation or limiting demand in direct ways. The alternative is that, frankly, you get airlines to cover their own environmental costs. We would support the idea of the polluter pays principle. So far, the aviation sector has been very lightly regulated when it comes to its climate change impact. The majority of aviation emissions do not attract any kind of charge or tax, notwithstanding the existence of the ETS and the global CORSIA scheme. That is likely to continue to be the case in the future. If you can develop mechanisms like carbon pricing that internalise those costs in ticket prices, that is another way of approaching it.

Q245 **Karl McCartney:** Indeed. The shipping industry is getting away with an awful lot more than the aviation industry, some would say. Helena, I think you want to come in.

Helena Bennett: From our point of view, the UK FIRES' line that nobody should be flying by 2050 is harsh. We are not advocating that at all. From a Green Alliance point of view, we are not even really advocating cutting numbers from pre-pandemic levels. It is the projected unconstrained and unabated growth that is the issue. DFT, even in its most optimistic scenarios in the jet zero strategy has projected a passenger demand increase of around 60% up to 2050. The CCC's balanced pathway is about 25%. Neither of those pathways will see large amounts of emissions reductions in the next 10 to 15 years.

We are not saying that we need to make sure that everybody only takes one flight per year. It is not as extreme as that. It is a case of making sure that the industry does not grow far beyond where it already is. That unabated growth, without a short-term emissions reduction, will lead to, if not an increase, a stagnation in aviation emissions over the next 15

years. DFT has projected that itself in its own pathways. Without going on to the implementation of how exactly you could do that, there is disjointed messaging within DFT about air travel.

I cannot remember the exact quote from the Williams-Shapps plan for rail published earlier this year, but it is something along the lines of, "We want to make sure that we get people off planes and on to trains, and out of their cars and on to trains," yet we are not seeing any kind of incentives to encourage that in the UK. We need to think about how we are managing the demand that the DFT is projecting. A 60% increase in passenger demand up to 2050 is not going to be sustainable.

Q246 **Karl McCartney:** Thank you, Helena. Andy, do you have anything you want to add to those two answers?

Dr Jefferson: No. Quickly from industry's perspective, we recognise that climate emissions are really important. We need to address it from aviation. We have made a commitment to net zero by 2050. We have a clear plan for how we believe we can achieve that. If the Government, in their jet zero consultation, are talking about a net-zero pathway and having five-yearly reviews of progress on that, from an industry point of view we would say give us a chance to get on and deliver that plan. If we are off-track in five years' time, let's have a conversation about whether we need demand management or not. Our view at this point is that we do not.

On the positive side, the other thing is to look at what this country has achieved recently with the vaccine development for Covid, and how quickly we can tackle a challenge or major issue that is a global problem and find a solution and implement it. Historically, in aviation we have been quite good at that, pioneering developments of jet engines, supersonic air travel, and so on. We believe that there is the potential, and it is achievable. Give us a chance before we start down the demand road.

Karl McCartney: I love the positivity, Andy. Thank you very much for that. I will hand over to my colleague, Ben Bradshaw.

Q247 **Mr Bradshaw:** Cait, in terms of the messaging, given that we have the technology to make much quicker and more comprehensive strides in carbon reduction on land transport now, and I think business travel will change enormously post Covid thanks to the use of new technologies and so forth, how helpful is it to boast about not flying for 10 years? There are millions of families in this country who have loved ones and family in south Asia, the Caribbean or Australia and New Zealand. To say to them that they should not fly for 10 years, meaning that they will not see their families, is a message that does not land well, if I can tell you that as an elected representative.

Cait Hewitt: I can well believe that. I did not say that. Just for the record, I have not made any recommendation about what—

Q248 **Mr Bradshaw:** No, but you said, "I have not flown for 10 years," and that comes across as a boast, if you do not mind me saying so.

Cait Hewitt: I apologise if you think that hit the wrong note. Sometimes, we can forget how many people do not fly or use aviation. People who fly regularly obviously value doing that, for all kinds of reasons. Therefore, they would feel it was a very big loss to their life and a very big sacrifice not to do that. It is important to remember that in any given year about half of the UK population did not take a flight, pre-pandemic. Obviously, globally that is very much larger still. About half of all global aviation emissions are generated by 1% of the population.

I recognise that people have family around the world, and I am absolutely not coming here today to say that those people should not fly home to see their families. I have two children. My son's best friend comes from Pakistan. My daughter's best friend is from Saudi Arabia. Do those families make a contribution to my life and my children's lives? Absolutely. We just need to think a little bit creatively about the range of options in what we can do. Are there some flights that can be replaced, as you have said, through overland travel? Are there some flights that could be taken to much shorter-haul destinations than to long-haul destinations, if you are talking about holidays? Those visiting friends and family remain a relatively small proportion of the total flights. Most aviation emissions are generated by people going on holiday. There are other ways to do that that we should be exploring and making the most of.

Q249 **Mr Bradshaw:** Going back to APD, we did not really get an answer from the industry earlier. You touched on it, but how would you reform APD to make it an environmental tax driving a clean, green aviation sector or altering individual behaviour?

Cait Hewitt: It is a big question. My short answer is to say that we would not argue. APD was never intended as an environmental tax, as we heard this morning. I agree with some of the analysis. It was introduced in recognition of the fact that fuel for international travel is untaxed, and that therefore it was felt that airlines were not making enough contribution to general public spending. The justification for introducing APD was to try to help make up a little bit of that shortfall.

There is a strong argument for that continuing to be in place. Airlines should make that contribution. Measures to incentivise faster technology take-up need to operate in parallel to the air passenger duty system. Something like carbon charging, taxes on kerosene or potentially air miles tax are the kind of targeted measures that we think need to be developed in parallel.

Q250 **Mr Bradshaw:** Helena or Andy, do you have anything to add on how you would formulate a sensible taxation regime?

Helena Bennett: I agree with Cait that something would need to come alongside APD. Again, I agree with the panellists earlier; it is not an

environmental tax, and I am not sure that many people see it as an environmental tax. Going back to the polluter pays principle, aviation as a sector has got off incredibly lightly compared with most other sectors in how much it is paying for the amount of emissions it is producing. That is reflected in things like how many people choose to fly from London to Glasgow instead of getting the train. The price differential for the amount of emissions it is producing is incredible. It is so much cheaper, as I am sure you all know.

I agree with most of the things that Cait outlined. There are things like extending the ETS, especially to cover non-CO_2 effects, because it is not covering them at the moment. It is a bit of a taboo term, but there could be a frequent flyer levy in some form; absolutely a kerosene tax; or reducing the amount of free allowances under the ETS that are allocated to aviation. At the moment, the volume of flights has not exceeded 2019 levels this year and probably will not next year, so aviation is not paying anything into the CORSIA scheme. There are so many things that could be done alongside APD.

This goes back to a previous point that we need planes to keep flying so that they can fund R&D into these technologies. The Treasury does not love hypothecation, but the taxes we are talking about now could help fund that and help incentivise the uptake of technologies, alongside reducing the number of passengers who might choose to fly instead of taking other modes of transport. There are lots of solutions that can be done reasonably easily and quickly that are not being touched on at the moment.

Q251 **Chair:** To conclude, Cait, I am going to put to Andy something that you said, to see if he can reassure you. In response to the net zero strategy you said, "The idea that by 2050 we'll be flying 'guilt free' on zero emissions planes for long-haul flight has no basis in reality."

Dr Jefferson: Look, I and the industry completely understand the nervousness. When you do a forward look and you say, "We think, based on our knowledge and experience, that sustainable fuels and new aircraft technology can get us to net zero", there will be people in the room who go, "Actually, I think you've gone mad and you're barking up the wrong tree. It's never going to be achieved."

It is achievable. We will get there. As in industry, we recognise that, if we do not get there, we will have lost our licence to grow and be around because the climate emergency is so important. We saw that at the latest COP. We had chief execs from the industry getting involved hand over fist in COP in a way that has never happened before. The growth of members wanting to be involved in Sustainable Aviation and the work we are doing, as well as the funding that is coming in on the back of that to support sustainable aviation fuels and new technology, is going up and up.

For me, it feels that there is real momentum behind getting to net zero and absolute acceptance that we have to do that. It is not an option. That is why I feel confident that we will get there. I am not saying it is going to be easy. It is not. There are challenges along the way, policy solutions and a whole heap of things that need fixing, but we can absolutely do it.

Q252 **Chair:** Cait, in response to that, I remember 29 years ago that people said that when the oil runs out we will not be able to drive our cars. Fast forward, we have electric vehicles. Do you not think that you are being slightly Luddite with your views that technology will not save the day, rather than expecting people to have to give up their ability to take a well-earned holiday and also work in a sector that pays well and looks after, or has looked after, its workforce?

Cait Hewitt: There are two different issues. The question of employment is really important. That needs direct attention from the Government in making sure that people at risk of losing their job are given appropriate support for transition to other work, if that is the right solution.

Am I being Luddite about this? I do not think so. We are not opposed to the development of new technologies. Indeed, they are going to be absolutely essential if we are to have any flights in the future in a net-zero context. I am talking, obviously, about the carbon capture and storage technologies as well as the stuff that goes into the aircraft themselves.

What we probably need is a much stronger policy framework to test the industry's performance, not just by 2050 but in the short term, against some kind of realistic and deliverable pathway to net zero. As Helena alluded to earlier, we should not be doing things like increasing airport capacity until we can see whether or not the industry is on a path to cutting emissions. That is a pathway that we need to see, not "Let's wait until the mid-2030s when these things have got going and we'll be able to sort it out." I think that would be the right way to approach it.

Chair: Thank you, Cait. That concludes our session. We have one final session, which will be in two weeks' time, when we will be delighted to have the Aviation Minister, the Civil Aviation Authority and a panel from the UK Health Security Agency, including Dr Jenny Harries, to talk about some of the reasoning behind the barriers to travel. We look forward to that.

Cait, Helena and Andy, thank you so much for giving us such great evidence and such good differences of opinion. We wish you well and look forward to keeping in touch.