

Environmental Audit Committee inquiry into Net Zero Aviation and Shipping



Response from the Aviation Environment Federation

3rd September 2021

Executive summary

- The Government is proposing a trajectory for aviation emissions with regular policy reviews. Setting a framework is necessary to support the industry, benchmark the performance of policies and measures, and to create investor certainty in CO2 mitigation options.
- The proposals for delivering this trajectory are incoherent and inadequate, however, and we hope that the EAC will challenge the Government to reconsider its approach, including undertaking more thorough modelling of a range of likely emissions scenarios using a wider mix of policy instruments; amending its stance on aviation growth; and putting in place clear measures and price signals.
- The Government is optimistic about the prospects for radical new aircraft technologies. These are unlikely to be operational for long-haul routes until after 2050, however, so offer limited potential for emissions mitigation. Savings from operational changes will also be marginal.
- Some alternative fuels may help to cut net aviation emissions. Given the limited time frame for achieving net zero aviation we are concerned, however, that the use of transitional fuels could create the illusion that the sector is on a pathway to decarbonisation at limited additional cost. All liquid fuels will have non-CO2 impacts, none of the existing options offer 100% CO2 emissions reduction, and all are likely to be expensive. The Government's assumptions in its emissions modelling presented in the Jet Zero consultation that SAF will be zero cost, and will deliver 100% emissions reductions, are not accurate.
- Aviation demand could be limited either directly or indirectly. Internalising the climate cost of flying into ticket prices, through carbon charges and measures to ensure that the industry pays for its own decarbonisation, would naturally suppress demand, and airport expansion should be halted.
- International measures to limit aviation emissions will be insufficient without strong domestic and regional measures delivered in parallel.

1. The Aviation Environment Federation campaigns on aviation, for people and the environment. Our focus is on aviation policy (relating to climate change, noise and air pollution), and we have participated in numerous Government engagement groups over the years. We currently have a seat on the Jet Zero Council. We have given oral evidence to several parliamentary committees including the Transport Committee and the Environmental Audit Committee and – on the topic of airport expansion – to committees of the London Assembly. Internationally, we are a lead member of the NGO grouping ICSA (the International Coalition for Sustainable Aviation) which has observer status to the UN’s International Civil Aviation Organisation.
2. We very much welcome this enquiry by the EAC, which coincides with consultations on several policy proposals from the Government related to the decarbonisation of aviation. The Government’s proposals represent, in our view, an incoherent and inadequate approach to the challenge of decarbonising aviation. They focus on measures will have little impact on total emissions (such as the proposal to decarbonise domestic aviation by 2040, or to require airports to become zero carbon for their ground-based operations by 2040) and on aspirations for future technology (including carbon removals to address residual emissions) and fuel developments. Few meaningful proposals have been put forward to hold the industry to account for its emissions. The scenario modelling has been conducted on the assumption that measures such as faster technology uptake, the introduction of new fuels and significant rollout of greenhouse gas removals are zero cost, with only a fixed ‘cost of carbon’ being assumed, based on BEIS figures from 2018 (prior to the Government’s commitments to achieve net zero emissions by 2050 or to include international aviation and shipping emissions in the UK’s legislation). Given these flaws in the analysis, the Government’s claim that the sector can achieve net zero by 2050 while airports and passenger numbers grow to the levels anticipated before either the Covid pandemic or the introduction of net zero legislation is not well substantiated.
3. We hope that the EAC will, by way of this enquiry, be able to challenge the Government to reconsider its approach, including undertaking more thorough modelling of a range of likely emissions scenarios under different policy frameworks; amending its stance on aviation growth; and putting in place clear measures and price signals. While we strongly welcome the Government’s commitment to include the UK’s share of international aviation emissions in its legal net zero target, there is a very short time frame to achieve this especially given the sector’s long lead time for certifying new technologies and the fact that aircraft remain in service for decades. Until the pandemic UK aviation emissions were continuing to rise, despite decades of claims by the industry that it was committed to tackling climate change, with 2019 aviation emissions being at the highest ever level. All potential measures to tackle emissions must now therefore be assessed in terms of their capacity to help deliver the 2050 net zero goal for aviation.

What contribution can operational efficiencies make to reduce emissions from aircraft/ shipping vessels and over what timescale could these have an effect on emissions?

4. Operational efficiencies such as air traffic control improvements and efficiencies at airports are likely to play only a very small part in delivering net zero aviation. DfT and CCC modelling combine their projections of operational efficiencies with aircraft efficiencies making it difficult to quantify the impact of operational changes alone, though the industry group Sustainable Aviation claims a potential reduction of 3.1 Mt by 2050 from this 'lever' compared with a 'business as usual' scenario – a 4% reduction on its projection of 71 Mt CO₂.
5. The Government claims in the Jet Zero consultation that “a significant proportion of our emissions reductions will come from improving the efficiency of our existing aviation system” and suggests that its plans for 'modernisation' of airspace will reduce emissions by helping to avoid aircraft stacking and to deliver more direct routing. The principal motivation for the airspace change programme, however, is to increase airspace capacity. While emissions from any given flight may be marginally reduced as a result of these efficiencies, overall aviation emissions will increase as a result of the extra traffic it facilitates. The airspace change programme is in any case controversial as a result of the noise impact associated with more concentrated flight paths (creating air traffic motorways), and impacts on new areas as a result of changes to routes. Many of our community group members are therefore opposed to it.
6. The Government has proposed a target of airport ground operations being net zero by 2040 and many airports, including Heathrow and Bristol, have made their own net zero commitments¹. While emissions from buildings, cars and vans do need to be tackled, however, airport emissions are only a very small percentage of an airport's total emissions once those from its flights are included, and it's questionable that they should even be count as part of an 'aviation' strategy given that they are not included in the nationally reported aviation statistics.

How close are zero carbon fuels to commercialisation for aviation/ shipping? How effective will the Jet Zero Council be in catalysing zero emissions technologies? What role should transitional fuels such as alternative hydrocarbon fuels play?

7. There is currently a big push globally from the aviation industry to argue that SAFs (Sustainable Aviation Fuels) can, with appropriate government investment, radically change the trajectory of future aviation emissions. Ministers are keen to believe that this is true, and have described these fuels as having the potential to deliver a future of 'guilt free' flying². The Department for Transport is currently consulting on the possibility of introducing a Sustainable Aviation Fuel mandate. In the absence of other near-term opportunities to mitigate their emissions, many in

¹ <https://www.aef.org.uk/2021/07/13/net-zero-airports-the-problem-with-airport-capacity-growth/>

² <https://www.aef.org.uk/2021/08/11/government-proposals-for-a-sustainable-aviation-fuels-mandate-key-questions-still-need-to-be-answered/>

the aviation industry are strongly supportive of this, alongside Government investment in new facilities to produce these fuels.

8. We have deep misgivings, however, about whether the kind of SAFs that are currently available should be regarded as offering either (a) genuine aviation emission reductions or (b) a scaleable solution. Both the aviation industry and the Government recognise that crop-based fuels are problematic for reasons of competition with agricultural and other land use needs. The focus therefore is on turning wastes, principally fats and agricultural wastes, into aviation fuel. When burned in an aircraft engine these fuels release at least as much CO₂ as kerosene, but it is assumed that some of the CO₂ has been captured in advance of its use through previous absorption by plants. In this way they represent a kind of 'advance offset'. In addition, a calculation is typically made of benefits arising from the avoidance of methane release associated with wastes being left in landfill sites. As a result, use of some waste-based fuels is sometimes claimed to be over 100%.
9. Our view is that 'avoided emissions' in one sector as a result of SAF use, as with offsetting, should not be claimed as emissions reductions in another in a net zero world where all sectors will need to achieve net zero emissions. In the long run, waste must be reduced and methane release must be minimised in addition to aviation achieving net zero. The use of waste as a fuel for aircraft therefore offers limited real emissions reduction, and will not be a scaleable solution in the longer term. The danger of providing subsidy or other incentives for the production of these fuels is that investment in real, long-term solutions may be delayed, and the false impression may be created that the industry is on a meaningful decarbonisation pathway, at relatively low cost, without any need for demand limits.
10. Theoretical options exist for the production of net zero carbon fuel, through the direct air capture of CO₂ which is then combined with hydrogen generated through electrolysis of water using renewable electricity. This is sometimes called e-fuel, or Power to Liquid fuel. No such fuel is yet on the market however and it is likely to be both very expensive and very energy intensive to produce, while the use of 'blue hydrogen' has not been ruled out. Our view is that, in line with the 'polluter pays' principle, airlines should pay the cost of its own decarbonisation. If the cost of this type of fuel were to be internalised in ticket prices, it would be likely to significantly increase the cost of flying.
11. Finally, aviation generates climate impacts in addition to those from CO₂ as a result of emissions of nitrogen oxides, soot, and water vapour among other emissions. The most recent scientific evidence suggests that aviation's total warming impact to date is around three times higher than that estimated by looking only at CO₂. Because some of these impacts arise only in certain atmospheric and meteorological conditions, however, and have variable lifetimes in the atmosphere (most are short-lived compared to CO₂), no policy or accounting measures have yet been devised to tackle them. Some SAFs may be able to mitigate non-CO₂ impacts to varying extents but none eliminate them.
12. The Jet Zero Council was created with a view to accelerating the take-up of net zero technologies for aviation. AEF has a seat on the council, but it exists largely as a government-

industry partnership. While the Council's terms of reference include a requirement to identify appropriate policy measures that could drive technology uptake, it is not a policy-making body. Some of its initial work on SAF has informed the SAF mandate consultation.

What new technologies are there to reduce emissions from aircraft/ shipping vessels and how close to commercialisation are they?

13. There is considerable uncertainty about whether and when all-electric or hydrogen-powered aircraft will enter the fleet. If they do become available, they are likely to be possible only on short routes. 95% of UK aviation emissions are, however, for flights over 500km³, suggesting a limited role for these technologies to deliver net zero emissions quickly enough.
14. The Jet Zero consultation features a number of electric and hydrogen powered aircraft on its front cover. It claims that "Zero emission flight technologies such as hydrogen-electric and battery-electric aircraft have already been demonstrated in the UK. Continued investment in these technologies could support a significant reduction in global aviation emissions." The evidence that DfT itself has commissioned to date does not however support this claim.
15. In 2018, the Department for Transport and the Committee on Climate Change had jointly commissioned *Understanding the potential and costs for reducing UK aviation emissions*⁴. The study's findings were summarised in Table ES-2, and notably, 'all electric propulsion' was not anticipated to be possible for any of the aircraft sizes considered until after 2055 – too late for the UK's legislated net zero target. The CCC's most recent analysis – the aviation paper published alongside the sixth budget advice in December 2020, is based on modelling that 'does not have a role for hydrogen turbine or hydrogen fuel cell planes by 2050'.
16. The Jet Zero 'evidence and analysis' document quotes several industry sources as claiming that small hydrogen-powered or all-electric aircraft could potentially enter the fleet between 2030 and 2035 and incorporates some of these aspirations into its 'high ambition' scenario. It acknowledges, however that 'the timelines for zero emission flight are still uncertain and depend on continual progression in battery, fuel cell and liquid hydrogen propulsion technologies'. While we support the aspiration to develop zero carbon aircraft for short routes – for example domestic travel that is difficult to replace with overland options such as flights connecting the Scottish Highlands with the mainland, the Government has presented no evidence suggesting that these technologies could feasibly be used on long-haul routes.

³ <https://www.sustainableaviation.co.uk/wp-content/uploads/2020/10/Sustainable-Aviation-CSR-Submission-FINAL-240920.pdf>

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785685/ata-potential-and-costs-reducing-emissions.pdf

How should the Government's net zero aviation strategy support UK industry in the development and uptake of technologies, fuels and infrastructure to deliver net zero shipping and aviation?

17. Given the early stage of development for many of these technologies and fuels, and the uncertainties about the pace of future developments, the Government should avoid being excessively prescriptive about any particular technology pathway. It should, instead, make clear what pathway to emissions reduction it expects the industry to achieve and what actions it will take (restricting capacity use, increasing taxes on flights etc) if these reductions are not achieved by specified dates. It should also make clear that the aviation industry will need to pay for its own decarbonisation. In relation to SAF, it should show how it will avoid double counting of emissions reductions (if fuels are generated from waste, for example, any reduction should not be claimed by the waste sector), and commit to an assessment of what the CO2 mitigation of different SAFs is based on an assumption that all sectors are on a pathway to net zero emissions (rather than making comparisons based on what happens today, for example in relation to landfill). These measures will help to create certainty for investors in relation to aviation mitigation options.

What is the most equitable way to reduce aircraft passenger numbers (e.g. reforming passenger duty and taxes, frequent flyer levies, bans on domestic flights where trains are available, restrictions on airport capacity)? Are there any policy mechanism that could reduce our reliance on shipping?

18. We would support an increase in aviation taxation as a means to raise public revenue, since it is clearly unjust that the sector is exempt from both VAT and fuel duty. We would also support the introduction of an air miles levy or similar, which targets those travelling furthest and most often, and we note that the post-Brexit UK-EU air services agreement now permits the UK to tax fuel on routes to EEA countries. We are less persuaded that a ban on domestic flights would be an effective means of tackling aviation emissions since 96% of the sector's emissions are from international travel, though it could have worthwhile signalling value as part of a wider package of measures.

19. The Government has said that it does not, however, plan to intervene directly to reduce passenger numbers, or even to limit passenger growth. We would suggest that there are many steps that the Government could and should take in relation to aviation emissions that would indirectly have an impact on demand. These include:

- Measures to internalise the carbon cost of flying into ticket prices, for example by requiring airlines to invest in the new technology, fuels or carbon removals necessary to achieve annual carbon targets
- Information for the public and for aviation consumers about the carbon impact of their flight compared with other transport choices
- Development of a sustainable tourism policy that creatively promotes domestic tourism, and that focuses on locations to which the UK can connect using sustainable overload travel when promoting both inbound and outbound tourism.

20. An end to the practice of giving rewards for flights (air miles or equivalent) would also be valuable. This would require action from the private sector, although the Government could consider additional taxes on the use of air miles to act as a disincentive.
21. We have long argued against UK airport expansion as a relatively easy step that the Government could take to limit environmental harm and we note that the CCC now recommends no 'net' increase in airport capacity. We would argue that this is not so much a direct intervention to limit demand as an appropriate means of managing supply that will prepare the industry for the lower levels that can be expected once carbon pricing is meaningfully introduced, and a detailed policy framework (as opposed to a high level strategy) is in place. Looked at another way, if carbon pricing were appropriately applied to airport expansion appraisals all proposals would likely be shown to have little or no economic value⁵.

What further action is needed by the International Civil Aviation Organization and International Maritime Organization to drive emissions reductions? What can the UK Government do to drive international action on emissions?

22. ICAO has yet to agree a long-term climate goal for international aviation emissions, although it is currently undertaking analysis to support a potential decision at its next Assembly in the autumn of 2022. While the Government is rightly encouraging other states to support net zero aviation by 2050, our first-hand experience of the climate discussions at ICAO suggests that getting political agreement amongst 193 states will be very challenging, and could result in either a significantly lower level of ambition or a delay to the decision. In our view, the Government's net zero aviation target will require a mix of international measures and domestic effort in parallel.

How effective will the global offsetting scheme for international airlines (ICAO's CORSIA) and the UK and EU ETS be at stimulating technology improvement and/ or behaviour change to reduce emissions from aviation/ shipping?

23. CORSIA is unlikely to stimulate any improvements. The change to its baseline because of the Covid-19 pandemic means that the sector is required to offset its growth above 2019 levels, a level it doesn't expect to achieve until at least 2024. Given that CORSIA is scheduled to finish in 2035, and has access to the voluntary carbon markets where prices are typically around \$5tCO₂ or less, a meaningful price signal is unlikely. Noting in addition that CORSIA isn't sufficiently focused on carbon removals (and is overly dependent on offsets generated through avoided emissions), the CCC has recommended that CORSIA units should not be eligible for compliance with UK carbon budgets, unless the scheme is reformed.
24. The UK ETS is likely to send a stronger price signal, especially if free allowances are removed and the cap is aligned with a net zero trajectory. However, it only applies to departures to domestic

⁵ See for example <https://twitter.com/chappersmk/status/1433407477014482953?s=20>

and EEA destinations and there is policy uncertainty about how it will interact with CORSIA where both schemes apply to the same flight. Our view is that the UK ETS has more integrity and should be maintained on these routes.

How should the UK define its ownership of international aviation and shipping emissions (i.e. arrivals, departures or both) in order to include them in legislative targets?

25. IPCC reporting guidelines, which the UK follows, suggest that emissions should be reported on the basis of all departing flights from a state to avoid double counting. In contrast, ICAO assigns emissions to states based on where a carrier is registered (i.e. the UK would report the global emissions from airlines that are based in the UK only). There are merits and equity issues associated with both approaches. In the past UNFCCC has also considered the nationality of passengers/freight and where the fuel is sold amongst other options. AEF would support an international review of the options, taking into account equity issues, but in the meantime we are supportive of the current approach to allocating emissions on the basis of all departing flights.