HACAN Response to DfT Jet Zero Consultation

September 2021

Introduction

HACAN (Heathrow Association for the Control of Aircraft Noise)[1] is a campaigning organisation formed in the 1970s to give a voice to residents under the Heathrow flight paths. We are a regional body covering London and part of the Home Counties.

Our members believe that the aviation unrestrained demand / supply model is distorted because the industry does not fully pay its environmental costs in terms of noise and emissions. These costs are born by local residents in terms of exposure to noise and the wider population in terms of local and global emissions.

According to the European Environment Agency, noise pollution is the second largest environmental threat to health, causing 12,000 premature deaths a year.[2] The harmful effects of noise include heart disease, annoyance and sleep disturbance.

There is a risk that technological solutions to carbon reduction may have adverse effects; for example, large scale electric aircraft may be significantly heavier and thus create even more noise than existing aircraft.

The Jet Zero consultation includes no analysis of this potential conflict. The only mention of noise is the referencing of industry claims of efficiencies also helping to deliver reductions in noise emissions. This is presumably through the airspace modernisation programme, yet there has been no evidence produced to date to explore how this might actually happen.

It is also not clear what the impact of Government Net Zero policy and the prioritising of carbon reductions will have on dealing with noise emissions and other non-CO2 emissions in the future.

1. Do you agree or disagree that UK domestic aviation should be net zero by 2040? How do you propose this could be implemented?

Agree. However, domestic flights account for just 4% of UK aviation emissions so the target date should be brought forward to 2030. This should be implemented by mandating that only electric aircraft can be used on domestic routes, using electricity from renewable energy.

[1] www.hacan.org.uk

[2] EEA (2020) Healthy environment, healthy lives: how the environment influences health and well-being in Europe. https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

The cost of flying remains far too cheap when compared to similar distances travelled by public transport. This price imbalance should be addressed by introducing tax on aviation fuel and by using the revenue raised to reduce the cost of public transport. Such a move would help incentivise passengers to use less carbon intensive forms of travel.

2. Do you agree or disagree with the range of illustrative scenarios that we have set out as possible trajectories to net zero in 2050? Are there any alternative evidence-based scenarios we should be considering?

Disagree. There are significant issues with the scenarios outlined as to how those reductions are delivered.

The focus should be on what is actually possible not what may happen. Currently the scenarios through which aviation might decarbonise are extremely optimistic and based on speculative technological breakthroughs that are in their infancy or do not yet exist.

The consultation contains little evidence to address the uncertainty identified in the scenarios, particularly what additional policy measures will be required to deliver net zero aviation should technological breakthrough not occur.

It is not clear why the recommendation of the Climate Change Committee for some form of demand management measures to reduce aviation emissions in the next decade has not been properly considered or an alternative policy proposal put forward.

3. Do you agree or disagree that we should set a CO2 emissions reduction trajectory to 2050?

Agree that it makes sense to set an emissions reduction trajectory, however there appears an absence of robust policy designed to ensure that the trajectory can be met.

Indeed, there is an acceptance that emissions from aviation can continue to increase before being reduced which appears to shift the responsibility for decarbonisation onto future Governments.

There is insufficient clarity around the pace of aviation's recovery. The financial hit that the pandemic has delivered is likely limit the capital available to invest in new aircraft or new technologies. Any delays to the introduction of less polluting aircraft is likely to extend the operation of the existing fleet thus reducing the capacity for such innovations to assist the decarbonisation effort.

a. Should the trajectory be set on an in-sector CO2 emissions basis (without offsets and removals) or a net CO2 emissions basis (including offsets and removals)?

The trajectory should be on an in-sector CO_2 emissions basis. Offsetting is not a credible policy mechanism as it does not stop aircraft from emitting greenhouse gasses into the atmosphere. Thus, it should not count towards reaching net zero, as advised by the CCC in the 6th Carbon Budget

Carbon removal such as direct air capture has not yet been developed and proven be operationally effective. There also associated issues with whether the carbon is stored or used.[3] Such initiatives may not increase carbon emissions but they may not reduce them either.

b. Do you agree or disagree with the possible trajectories we have set out, based on our high ambition scenario, which have in-sector CO2 emissions of 39 Mt in 2030, and 31 Mt in 2040 and 21 Mt in 2050, or net CO2 emissions of 23-32 Mt in 2030, 12-19 Mt in 2040 and 0 Mt in 2050?

We disagree with the trajectory of allowing an increase in emissions in 2030. It is clear that reductions in emissions are required aviation now if Government are to meet their target of 78% reduction by 2035.

The fact that in-sector emissions remain at 21Mt in 2050 means that net zero aviation is not possible even in the Government's high ambition scenario. The consultation has not set out what implications this will have on decarbonisation efforts in other sectors of the economy.

4. Do you agree or disagree that we should review progress every five years and adapt our strategy in response to progress?

An annual review would appear more appropriate as it is not obvious that a progress review every 5 years will be sufficient to address the challenge of decarbonisation of the aviation sector.

Government policy will need to evolve quickly should the expected investments and technological developments not occur at the pace anticipated and thus emissions remain higher for longer.

5. Do you agree or disagree with the overall approach to improve the efficiency of our existing aviation system?

Disagree. The assumption of 2% efficiency gain per annum conflicts with the available evidence.

[3] Transport & Environment (2021) What role for Direct Air Capture (DAC) in e-kerosene? https://www.transportenvironment.org/sites/te/files/publications/DAC%20briefing%20e4tech%20report.docx%20%283%29.pdf

The International Civil Aviation Organisation (ICAO) in 2019 assumed long-term overall efficiency gains, even under the most optimistic scenario, of 1.37% per annum. This includes improvements associated with both technology and operations.[4] The United Nations Environment Programme UNEP similarly states that likely improvements in aircraft airframes and engines in the next 20 or so years will improve the burn-fuel metric by around 1.2% per year.[5]

These potential efficiency gains do not come close to matching the projected and desired growth (5% per annum) from the aviation industry, and are insufficient to reduce emissions from the current level.

Baledón & Kosov (2018) highlight that ICAO's assessments on fuel consumption and emissions show that the aggregate environmental benefit achieved by a combination of the technological and operational measures will be insufficient to attain carbon-neutral growth from 2020. This means that international aviation will be increasingly reliant on the use of alternative jet fuels to achieve greater carbon reductions.[6]

6. What more or differently could be done to ensure we maximise efficiency within the current aviation system?

Pidcock and Yeo (2016), show that carbon emissions from international aviation will still represent 12% of the 205Gt remaining global CO_2 budget in 2050, even if technological and operational efficiencies are maximised and the total demand for conventional jet fuel is met with alternatives. This may rise to 20% should alternative jet fuels not become available in sufficient quantities. [7]

That is why the government should be considering robust demand management measures, including the introduction of a frequent flyer levy.

7. Do you agree or disagree with the overall approach for the development and uptake of SAF in the UK?

Disagree. The consultation provides no policy clarity or indication of the size of, if any, investment that Government believes is necessary to support the development of SAF.

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[4] ICAO (2019) Environmental Trends in Aviation to 2050. https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2019/ENVReport2019_pg17-23.pdf

[5] UNEP (2020) Emissions Gap Report. https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/34431/EGR20ch5.pdf?sequence=3

[6] Baledón & Kosov (2018) "Problematizing" carbon emissions from international aviation and the role of alternative jet fuels in meeting ICAO's mid-century aspirational goals. Journal of Air Transport Management, Volume 71, August 2018, Pages 130-137 https://doi.org/10.1016/j.jairtraman.2018.06.001

[7] Pidcock & Yeo (2016). *Analysis: aviation could consume a quarter of 1.5C carbon budget by 2050.* Retrieved from: https://www.carbonbrief.org/aviation-consume-quarter-carbon-budget

Biofuels in general are complex solution to manage as they can only be considered 'sustainable' if recruited from waste streams (which requires external verification), could discourage waste reduction strategies and encourage deliberate creation of 'waste' oils. Biofuels direct sourced from crops would not qualify as sustainable.

Large-scale production of alternative jet fuels could also increase the environmental impacts linked with intensive agriculture of dedicated bioenergy feedstocks (Novelli, 2011)[8], and result in an absolute increase of carbon emissions from international aviation (Staples et al., 2018)[9]. The proposed approach does not appear to take this into account.

In 2010, the aviation industry pledged to source 10% of fuels from sustainable sources in 2020. Yet by 2018, the industry had managed to source a grand total of 0.002%. Sustainable Aviation Fuel (SAF) production today is still less than 1 percent of overall jet fuel supply despite being pitched by the industry as the panacea for decarbonisation.

The current global targets for approximately 50% alternative jet fuel use in 2050 would require three new bio-jet fuel refineries to be built every month for the next 30 years. Today there are just two facilities – the market is not delivering at the pace required.

There are unresolved issues around the definition of 'sustainable' for Sustainable Aviation Fuels (SAF) as there is not a single internationally agreed definition of SAF, nor is it clear how emissions in production are accounted for. There is an assumption of benefit of waste being turned into fuel as opposed to be left to rot (thus generating methane), however jet fuel from waste could still generate similar levels of carbon emissions as kerosene. In order to achieve net zero both the methane and carbon emissions need to be avoided.

The Climate Change Committee (CCC) advises that we shouldn't plan for aviation biofuel to exceed 10% of total aviation fuel use by 2050.[10] The International Energy Association (IEA) Sustainable Development Scenario (SDS), anticipates biofuels reaching around 10% of aviation fuel demand by 2030, and close to 20% by 2040.[11]

However, the price of biofuel is again crucial. Lu (2018) discovered a cost benefit ratio of more than five has been shown for biofuel usage, suggesting that this is not economical compared with traditional fuel. The results show that it is not until biofuel price is just around 8-11% higher than the traditional fuel that the use of biofuel becomes more economical than

[8] Novelli, P. (2011) Sustainable way for alternative fuels and energy in aviation (SWAFEA), report prepared for the European Commission's directorate general for mobility and transport. https://www.icao.int/environmental-protection/GFAAF/Documents/SW_WP9_D.9.1%20Final%20report_released%20July2011.pdf

[9] Staples, M.D., Malina, R., Suresh, P., Hileman, J.I., Barrett, S.R.H., 2018. Aviation CO_2 emissions reductions from the use of alternative jet fuels. Energy Pol. 114 (C), 342–354. https://doi.org/10.1016/j.enpol.2017.12.007

[10] https://www.theccc.org.uk/wp-content/uploads/2013/04/Aviation-factsheet.pdf

[11] https://www.iea.org/commentaries/are-aviation-biofuels-ready-for-take-off

traditional fuel.[12] Thus, whilst alternative jet fuels may play a role it is not yet clear how significant this role might be in terms of decarbonisation.

In our view 2030 is too late before a SAF-specific review is undertaken. An initial review should be taken by 2025 at the latest and then on an annual basis thereafter to ensure that both the proposed policy framework and the industry is delivering as required.

8. What further measures are needed to support the development of a globally competitive UK SAF industry and increase SAF usage?

A report commissioned by the UK Department for Transport to look into the feasibility of commercial SAF plants in the UK found that there is a pool of UK and international developers that could build such plants. However, there is significant technology risk, high capital costs and uncertainty on the monetary value of policy support, meaning that this industry needs to overcome a number of key barriers before it can take off. The study concludes that first-of-a-kind commercial plants could cost between £600m - £700m.[13]

It is not clear how much investment industry or Government is willing to commit to enable alternative aviation fuels generation to be scaled up and sold at a price that is competitive with kerosene.

There also seems to be a lack of confidence regarding the development of SAF within the fuel industry as reported by the Guardian 19th January 2021[14]

It is difficult to make a strong case for public investment in such risky initiatives that benefit one sector when there are many pressing demands for public capital that could more effectively address the decarbonisation challenge.

9. Do you agree or disagree with the overall approach for developing zero emission flight in the UK?

The industry's own assessment suggests that even if a technological breakthrough does become commercially available before 2050, new technological developments in the aviation sector usually take up to a couple of decades before reaching maturity (IATA, 2013).[15]

Peeters et al (2016) conclude that,

[12] Lu, C. (2018) When will biofuels be economically feasible for commercial flights? Considering the difference between environmental benefits and fuel purchase costs. Journal of Cleaner Production Volume 181, 20 April 2018, Pages 365-373. https://doi.org/10.1016/j.jclepro.2018.01.227

[13] https://www.e4tech.com/uploads/files/final-report-aviation-abdc-feasibility-study-issue-v1-0.pdf

[14] https://www.theguardian.com/business/2021/jan/19/shell-pulls-out-of-joint-venture-to-build-uk-sustainable-jet-fuels-plant

[15] IATA, 2013. Technology Roadmap, fourth ed. Retrieved from: https://www.iata.org/whatwedo/environment/Documents/technology-roadmap-2013.pdf

"conclude that technology myths require policy-makers to interpret and take into account technical uncertainty, which may result in inaction that continues to delay much needed progress in climate policy for aviation."[16]

Further, Hassan et al (2018), highlight that despite environmental targets set by IATA, the achievability of meeting all those targets is extremely low (0.3%) for the expected demand growth rates in the US.[17]

Electric Aircraft

Analysis by Fellow Travellers[18] reveals that electric aircraft in development today have the technical potential to cut 13% of UK aviation's greenhouse gas emissions. Delivering this level of emissions reduction before 2050 would require regulation and major market intervention to accelerate product development and fleet turnover cycles.

Engineering constraints mean larger gains are unlikely in this timeframe, and it is probably not possible for transatlantic-range battery powered craft to be economically viable. There are no electric aircraft currently in development which could compete with the majority of the current global civil aviation fleet on range or capacity.

Electric aircraft will not reduce their weight due to fuel combustion over the duration of a flight. This means on a like for like basis, electric aircraft may be heavier on arrival leading to an increase of airframe noise. HACAN has a reasonable expectation that as electric aircraft are developed noise reduction remain a key design factor and noise from arriving aircraft will not increase in the future.

Hydrogen

In June 2021, Airbus told the EU that most airliners will rely on traditional jet engines until at least 2050. They plan to develop the world's first zero-emission commercial aircraft by 2035, but assert that, *"Zero-emission hydrogen aircraft will be primarily focused on regional and shorter-range aircraft from 2035. Which means that current and future iterations of highly efficient gas turbines will still be required as we move towards 2050, especially for long-haul operations."*[19]

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[16] Peeters et al (2016). Are technology myths stalling aviation climate policy? Transportation Research Part D 44 (2016) 30–42. https://doi.org/10.1016/j.trd.2016.02.004

[17] Hassan, M., Pfanender, H., & Mavris, D. (2018) Probabilistic assessment of aviation CO2 emission targets. Transportation Research Part D 63 (2018) 362–376. https://www.sciencedirect.com/science/article/pii/S1361920917300548

[18] Fellow Travellers (2018) *Electric Dreams: the carbon mitigation potential of electric aviation in the UK air travel market*. https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/Electric+Dreams.pdf

[19] https://www.reuters.com/business/aerospace-defense/airbus-tells-eu-hydrogen-wont-be-widely-used-planes-before-2050-2021-06-10/

If hydrogen is to form part of the Government's alternative aviation fuels strategy then it will need to set goals that are realistic and achievable, and focus on creating a secure market for green hydrogen with high sustainability standards so that industry can make the long-term investments that are required to scale up sustainably. As stated above only hydrogen currently produced by electrolysis could hope to meet this standard depending on where the electricity needed is generated from.

10. What further measures are needed to support the transition towards zero emission aviation?

The introduction of effective demand management measures and the promotion of alternatives to air travel should be accompanied by a tougher regulatory framework for aviation emissions.

11. Do you agree or disagree with the overall approach for using carbon markets and greenhouse gas removal methods to drive down CO2 emissions?

Disagree. The carbon price in the UK ETS remains too low and airlines should not be being given an effective free pass. Greenhouse gas removal (GGR) technologies are in their infancy and the timescale for their scaling up is very uncertain.

At the start of 2020, ICAO's governing body agreed that six offsetting programmes were eligible to be considered within CORSIA, one of which is the Clean Development Mechanism (CDM). The European Commission already reported that 85% of the offset projects under the CDM failed to reduce emissions.[20]

The United Nations Environment Programme estimated in 2020 that the international CORSIA aviation offsetting scheme *"will result in the offset of only 12% of total international and domestic aviation emissions by 2030".*[21]

Further, the CCC has advised the Government not to use CORSIA as a way to meet our 2050 net zero target. CORSIA does not include an actual emissions reduction target. It relies on airlines buying offsets to compensate for their emissions growth, which will never be enough to offset the known damage of flying, and is also at odds with the Paris agreement's goals.

12. What could be done further or differently to ensure carbon markets and greenhouse gas removal methods are used most effectively?

[20] https://www.transportenvironment.org/press/eu-publishes-damning-report-emissions-offsets-calling-question-eu%E2%80%99s-aviation-climate-strategy

[21] https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/34431/EGR20ch5.pdf?sequence=3 (p.59)

Increasing the price of carbon to reflect the true environmental cost. The non-CO2 impacts of aviation should also be monetised and reflected in ticket prices given the significant impact they have on climate warming.

13. Do you agree or disagree with the overall focus on influencing consumers?

Agree that this is an important first step to providing environmental information.

14. What more can government do to support consumers to make informed, sustainable aviation travel choices?

Aviation taxes should increase in line with those paid by motorists to help generate additional revenue (around £10bn per annum) for the Treasury. It is clear from the advice of the CCC and the International Energy Association that aviation policy needs to include demand management.

HACAN believes that taxing flights and distance flown would appear to better align with the Government's environmental objectives by ensuring airlines maximise their available capacity and that those who fly the furthest pay the most.

A per flight tax could be based on just two factors, the aircraft type and the distance travelled. The Government can set the tax for the aircraft and it would then be up to the airline as to how it distributes that cost amongst passengers.

HACAN endorse the work of Possible in their proposal for a frequent flyer levy[22] and the New Economics Foundation in their analysis and assessments of how a frequent flyer levy could be introduced.[23]

A frequent flyer (or air miles) levy would be an effective, social, just and morally defensible way to reduce UK aviation emissions while maintaining access to air travel for all members of British society.

15. What could be done further or differently to ensure we tackle non-CO2 impacts from aviation?

The Government should apply a full life-cycle analysis of air transport infrastructure and supply chain emissions (manufacturing, operation, maintenance, etc.) into the environmental

[22] Proposal for a frequent flyer levy https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/FFL+Policy+Proposal.pdf
[23] Managing Aviation Passenger demand with a frequent flyer levy https://s3-eu-west-1.amazonaws.com/media.afreeride.org/documents/FFL+Modelling+paper.pdf

impact assessment of international aviation. According to Chester and Horvath (2009)[24], this would contribute at least an additional 31% to the tailpipe emissions. This would provide a more comprehensive understanding of the carbon contributions of international aviation to climate change and a better chance to effectively mitigate the environmental impacts of air transport.

Emissions of aircraft at altitude also include non-CO2 pollutants and these are not properly understood or accounted for. It is likely that including non-CO2 emissions would result in a doubling of the overall climate impact of aviation.[25] Following the recommendation of the CCC it is vital that further research is commissioned to guide policy and regulations for non-CO2 emissions.

The UN's Sustainable Development Goal 12 (SDG.12)[26] on responsible consumption and production has been mainly approached by the aviation sector from a technological perspective. However, many of these technological efficiencies introduced over the years would have taken place regardless of the sector's climate commitments and as a result of cost-reduction strategies and compliance with local regulations.

SDG.12 urges governments to adopt regulatory and policy measures to phase-out fossil-fuel subsidies so as to reduce the environmental externalities of wasteful consumption. However, there are no initiatives from ICAO, its Member States or the industry to address these targets and they are not mentioned in their official reports.

[24] Chester, Mikhail V.,& Horvath, Arpad, 2009. Environmental assessment of passenger transportation should include infrastructure and supply chains. Environ. Res. Lett. 4 (2), 1–8. https://iopscience.iop.org/article/10.1088/1748-9326/4/2/024008/pdf

[25] Lee et al (2021) The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. Atmospheric Environment, Volume 244, 117834. https://doi.org/10.1016/j.atmosenv.2020.117834

[26] https://www.un.org/sustainabledevelopment/sustainable-consumption-production/