



Evidence and submission papers

**Environmental Audit
Committee call for
evidence: airport
expansion and climate
and nature targets**

2025

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This response from the Grantham Institute – Climate Change and the Environment, Imperial College London, was submitted on 2 May 2025.

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About the contributors

Dr Fantuzzi's evidence draws on his work as a contributor to the widely-cited 2023 Royal Society policy briefing "Net zero aviation fuels: resource requirements and environmental impacts, and as one of the authors of an Imperial College London briefing paper also published in 2023 "Low carbon fuels for aviation".

Professor Hansell, Professor Blangiardo and Dr Konstantinoudis lead a multidisciplinary research collaboration conducting an extensive programme of research on aircraft noise and health; it includes researchers at the University of Leicester, Imperial College London, University College London and City University London.

About the Grantham Institute

The Grantham Institute sits at the heart of Imperial College London's work on climate change and the environment. We drive forward discovery, convert innovations into applications, train future leaders and communicate academic knowledge to businesses, industry, and policymakers to help shape their decisions.

Summary:

- The noise impacts of airport expansion should be treated as a public health hazard and given greater weight in assessments of the effects of airport expansion. The noise provisions in

the 2018 ANPS should be updated in light of the increased evidence of health impacts that is now available.

- There are meanwhile fundamental challenges associated with the scale-up of so-called Sustainable Aviation Fuels, which ministers have described as a key measure for cutting the emissions associated with airport expansion. Aviation emissions will be difficult to reconcile with net zero targets even without expansion, with any increase in airport capacity making that challenge harder, if not impossible.

Expanding airport capacity within the Government's climate and environmental obligations

Which statutory targets and which non-statutory obligations (both national and international) relating to climate and the environment apply to Government policy on (a) the development of UK airport capacity in general and (b) the development of Heathrow and other airports in the South East of England in particular

[Response from Anna Hansell, Marta Blangiardo and Garyfallos Konstantinoudis]

1. Background:

Noise is one of the major concerns expressed by the public with respect to expansion of airport capacity, and airport expansion often results in an increase in the number of people impacted by noise, with some people being newly impacted. Our evidence takes as its starting point the assumption that the government should understand the most recent research findings on the health impacts of noise when making policy or decisions that could exacerbate these impacts.

2. In 2023 the House of Lords Science and Technology Committee held an inquiry into the health effects of noise and light pollution at which members of our research collaboration gave evidence (<https://lordslibrary.parliament.uk/house-of-lords-science-and-technology-committee-report-impact-of-noise-and-light-pollution-on-human-health/>). Among other report recommendations, the Committee called for a specific noise reduction target for the regulation of noise pollution, as well as for an interdisciplinary, independent advisory panel to be established to provide independent advice to the government and a forum for new evidence. Neither of these were – unfortunately – accepted in the government's response, and it remains the case that there is no national regulation for noise levels. The recommendations of that committee may, however, be relevant for the Environmental Audit Committee's current considerations.

3. Current evidence on noise impacts on health:

All current methods estimating the impact of noise on health are likely to provide underestimates of the true burden, as they do not take into account the most recent research and the evidence base relating to health has greatly expanded in the last decade.

Nevertheless, the existing key documents relevant to noise and health already provide cause for concern. For example, environmental 'burden of disease' calculations published in 2014 found noise to be the second most important cause of ill health in Western Europe, behind only fine particulate air pollution (Hänninen 2014). In 2018, the World Health Organization

(WHO) published Noise Guidelines for the European Region (<https://www.who.int/europe/publications/i/item/9789289053563>) based on systematic reviews of studies published to 2015. These showed good quality evidence for associations with ischaemic heart disease in relation to road noise, with some evidence for associations with aircraft noise based on a small number of studies.

4. Our research team members worked with the noise team at the UK Health Security Agency to publish the burden of disease from noise in England in 2023 (Jephcote 2023). We found there were 17,000 disability adjusted life years (DALYs – a combined measure of premature mortality and years lived with a disability) associated with aircraft noise exposure in 2018. Our burden of disease work was highlighted by the House of Lords when its Select Committee report on noise was published.

5. Recent research on aircraft noise and health:

Our very recently published findings (which will not be taken into account in current health impact assessments of aircraft noise) include evidence for the following impacts.

5.1 *Impact of aircraft noise on the heart*

Higher long-term average aircraft noise levels were associated with worse heart structure and function on cardiac magnetic resonance imaging (MRI) in 3,635 people taking part in the UK Biobank study who lived near four UK international airports (Topriceanu 2025). This is the first study to look at aircraft noise and cardiac function. 'Higher aircraft noise' was here defined as noise of over 50 decibels on average during the day and 45 decibels on average during the night (11pm-7am).

- 5.2 The link between aircraft noise and heart structure and function is significant, as separate analyses (of people not exposed to aircraft noise) found that these types of heart abnormalities could result in two- to four-fold increased risks of a major cardiac event. Our analyses suggested that some of the effect was due to noise impacts on blood pressure and body mass index. An editorial accompanying the paper, also published in the Journal of the American College of Cardiology 2025 (Münzel 2025), concluded "This [study] emphasizes the need for immediate implementation of noise reduction policies to protect us and, in particular, vulnerable populations from the harmful effects of chronic aircraft noise exposure."

5.3 *Increased short-term risks of cardiovascular events*

We found a small increase (comparable to that seen in relation to short-term elevations in air pollution levels) in the risk of admission to hospital for cardiovascular disease associated with higher aircraft noise exposure in the evening or night-time hours of the previous day (Itzkowitz 2023). The study followed 6.3 million individuals living near London Heathrow airport in 2014-18. Given the large number of individuals exposed to aircraft noise, any increase in risk is important in terms of public health.

5.4 *Objective evidence of disruption to sleep and sleep-wake cycles using activity monitoring*

In this study (Gong 2024), we examined actimetry data (similar to a 'fitbit') for >20,000 individuals living near one of four major UK airports.

6. Findings from forthcoming work, currently available in the public domain as conference abstracts or proceedings include the following.
 - 6.1 Higher aircraft noise is associated with increased mortality risk. Those living in areas with highest level of aircraft noise had significant increased risks of both all-cause mortality and hospital admissions for all cardiovascular disease, with the highest risks seen with ischaemic heart disease (<https://www.isesisee2025.org/program/> Abstract number #2575) and for night-time noise exposure. This study followed 105,751 participants in the UK Biobank cohort who lived in one of 44 districts partially or wholly within Civil Authority Aviation (CAA) airport noise contours of 4 major UK airports (London Heathrow, London Gatwick, Birmingham, Manchester).
 - 6.2 Higher levels of both 24-hour and night-time aircraft noise were associated with a greater risk of developing hypertension in ~100,000 individuals in the UK Biobank cohort, living near the 4 major UK airports listed above (<https://ehp.niehs.nih.gov/doi/10.1289/isee.2023.OP-055>)
 - 6.3 Highest noise levels at Heathrow are between 6-7am (<https://www.icben.org/2023/index.html> Gong et al, ID 127), potentially disrupting sleep. For these analyses, we conducted noise modelling for specific time periods of the day and night and for numbers of noisy events (where aircraft noise exceeds a 60dB maximum sound level) in 2014-18. These are important noise metrics but are not currently provided by the Civil Aviation Authority. The timing of peak noise levels is of concern as our study on sleep (Gong 2024) found that the most common sleep hours are between 11pm-7am.
 - 6.4 We note that the 2018 “Airports National Policy Statement (ANPS): new runway capacity and infrastructure at airports in the south-east of England” states: “The Government also expects a ban on scheduled night flights for a period of six and a half hours, between the hours of 11pm and 7am”. This is still likely to mean that for a large percentage of individuals there is potential for disruption from aircraft noise in their usual sleep period, as is seen at Heathrow. The 2018 ANPS also refers to a baseline noise level being set as 2013 levels (section 5.58), which is of concern given that our research, which shows health effects from aircraft noise, uses aircraft noise from 2011, which will not be substantively different from 2013.

7. **Our conclusions relating to aircraft noise and health:**

While noise has historically been considered only a nuisance, resulting in annoyance and sleep disturbance, our research and previous considerations by the WHO and UKHSA very strongly suggest that exposure to higher levels of aircraft and road noise (both of which can arise from airport expansion) needs to also be considered a health hazard and that this should be given more weight in assessments of the impacts of airport expansion. We are particularly concerned about night-time noise as risk associations are often higher than for daytime exposures.

What emissions reductions from domestic and international aviation are currently likely to be required to meet the Sixth Carbon Budget; and what effect the Government’s policy on airport expansion is likely to have on the ability to deliver these reductions.

[Response from Andrea Fantuzzi]

8. The Sixth Carbon Budget requires an emissions reduction of 78% by 2035 compared with 1990 and includes emissions from international (and domestic) aviation. The aviation sector follows a very different trajectory from the average across the economy, however. UK aviation emissions are currently, despite a dramatic reduction during the Covid lockdown, around 100% higher than they were in 1990 (DfT Official Statistics, 24.4.25), and the CCC's modelling for the Sixth Carbon Budget anticipates only a small reduction on today's level by 2035 even based on levels of demand that would not require any airport expansion (CCC Sixth Carbon Budget: Aviation).
9. A significant cut in aviation emissions, even without the proposed and planned airport expansions, will be very difficult to achieve. There has been intense focus among the aviation industry and UK government ministers, on the potential for substituting jet fuel of fossil fuel origin with fuels produced from more sustainable sources. Among the suggested solutions, only 'sustainable aviation fuels' produced from materials of biological origin are currently being produced, even though on a very small scale.
10. Nevertheless, as previously outlined in reports from the Royal Society and the Institute for Molecular Science and Engineering at Imperial College London, there are several caveats that cast doubts on the ability of this solution to achieve the desired emission reductions, especially if considering both national and international flights. Three examples are listed below.
 - 10.1 Currently, sustainable aviation fuels of biological origin are certified to be used blended with traditional jet fuel to a maximum of 50%, in order to maintain the correct physical-chemical properties of the fuel. If we combine this with the minimum GHG saving defined in the 2024 SAF mandate of 40%, we see that implementation of sustainable aviation fuels could result in GHG reductions of less than 20%. The fuel production for test flights using 100% SAF has required specific 'fractions' of SAF with the desired properties to be selected, reducing the overall production yield from biomass to fuel compared to flights that use a blend of SAF and fossil jet fuel. The implication is that using 100% SAF in flights would require several times more feedstock biomass than the traditional approaches, leading to increased stress on feedstock availability.
 - 10.2 The second point of concern is the availability of biological feedstock in sufficient amount to satisfy the demand. This is because these feedstocks are either in relatively low amounts, such as the exhausted used vegetable cooking oils, or are diluted over very large geographical areas, such as forest and agricultural residues. Competition with other industries and potential environmental negative effects raises doubts about the availability of sufficient biological feedstocks.
 - 10.3 It is well established that CO2 emissions account for only a third of the GHG associated with aviation, with the other contributors being contrails and NOx. SAFs are designed to tackle the CO2 emissions and their effect on the other two components is still debated and poorly studied. So ultimately, SAF implementation would result in less than 10% GHG reduction.
11. An alternative solution to SAFs made with biological materials could be to adopt 'power to liquid' fuels, produced using direct air capture of CO2. Nevertheless, these are currently not

available at scale and will require very large amounts of electricity produced with sustainable technologies – capacity that is currently not available.

12. These points illustrate the challenges of achieving GHG reductions in the aviation industry by way of so-called Sustainable Aviation Fuels. Airport expansion and the associated increase in flight and passenger numbers can only make the achievement of GHG reductions more difficult if not impossible.

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