FLIGHT BLIGHT

THE SOCIAL AND ENVIRONMENTAL COST OF AVIATION EXPANSION

CPRE
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The social and environmental cost of aviation expansion...

Executive Summary

For many people, aircraft noise is a real problem. Research shows that aircraft noise is more 'annoying' than road or rail noise and that we are becoming increasingly sensitive to it. Tolerance to aircraft noise is about more than the noise level, non-acoustic, socio-psychological factors play a key role, including expectations. If you are 'expecting' peace and quiet, for example in the countryside, then noise is much more 'annoying.' People who 'trust' an airport find aircraft noise less 'annoying.' Other European countries monitor and report at lower noise threshold levels than the UK as this better reflects people's experience of aircraft noise.

The Committee on Climate Change (CCC) provides Independent advice to government on building a low-carbon economy and preparing for climate change. It has recommended that the government plans for international aviation and shipping to achieve net-zero emissions by 2050 and that this should be reflected in the government's forthcoming Aviation Strategy. The CCC states that it will be necessary to reduce actual emissions from the aviation sector. Until now, there has been a natural cap on aviation emissions due to runway capacity. If greater capacity is supported, then there will be unwanted growth in carbon emissions.

We believe that;

1. The UK should monitor and report at lower noise threshold levels as this better reflects people's experience of aircraft noise. Non acoustic, socio-psychological factors should be given a raised priority in the design of noise management strategies.

2. Government should commission independent research into the impact of aviation noise on health, especially in relation to night flights, to accommodate recommendations by the World Health Organisation (WHO).

3. The Independent Commission on Civil Aviation Noise (ICCAN) should be given statutory powers so that communities develop more trust in the aviation industry. ICCAN should become an ombudsman so that complaints can be dealt with in an independent way.

4. The government should include aviation emissions within the net zero greenhouse gas emissions target as recommended by the CCC and this should use a consistent approach that includes emissions above 3,000ft. Further aviation expansion should be ruled out on climate grounds.

Introduction

All around the world, the aviation sector is growing. Figure 1 shows the locations of the 12 largest airports in England based on 2018 passenger numbers. The UK government is preparing an Aviation Strategy which sets out its plans for aviation growth in the UK for the next 30 years. The Aviation Strategy Green Paper was put out for consultation in early 2019. CPRE and other organisations such as the AEF (Aviation Environment Federation) responded to this consultation with concerns that aviation expansion cannot be accommodated within existing climate change commitments and that the link between aviation noise and health needs to be more fully researched, particularly in respect of night flights.

CPRE was created in 1926 in response to concerns over the industrialisation of the countryside and loss of wildlife. CPRE has conducted research into dark skies, tranquility and other characteristics of the countryside. Aircraft noise disrupts the tranquility of the countryside and air traffic contributes significantly to the UK's carbon footprint. CPRE believes that the recent rapid expansion of aviation exceeds environmental limits and that the government is failing to protect the natural world and local communities. In order to better understand the noise and health impacts of aviation, the CPRE Network Aviation Group (comprised of all CPRE groups in the South East impacted by aviation) commissioned independent aircraft noise research to be undertaken. The report, which was produced by To70, uses Gatwick as an example[1].Similar considerations might be applied to other regional airport expansion plans.

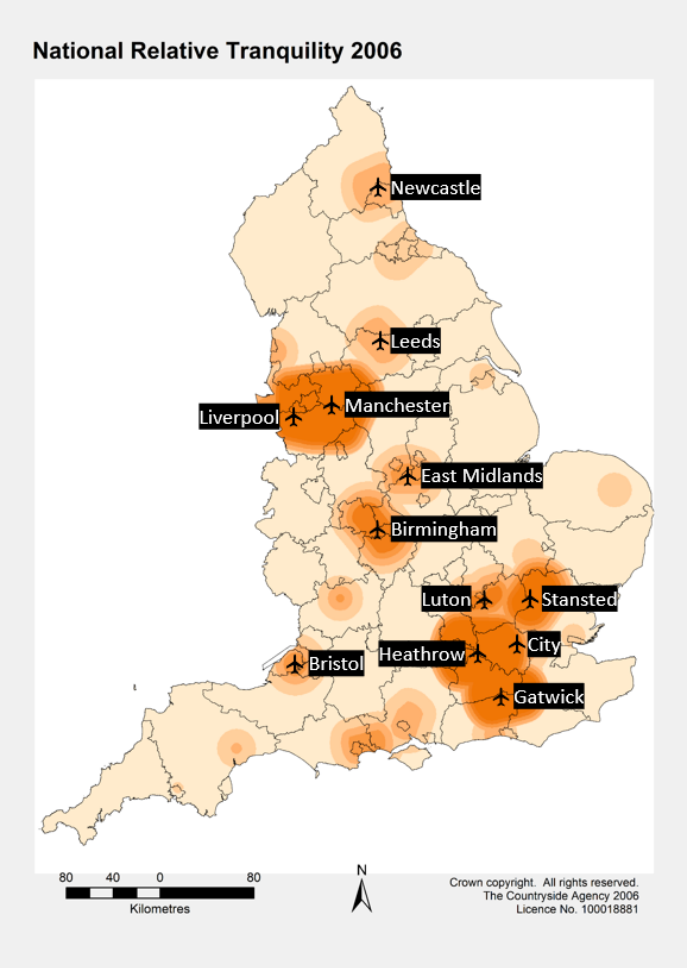

Figure 1

[1]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.

Aircraft Noise Levels

Research shows that people find aircraft noise more 'annoying' than road or rail noise[2]. Other European countries monitor and report at lower noise threshold levels than the UK as this better reflects people's experience of aircraft noise. Using lower threshold levels acknowledges the health impacts created by aircraft noise and enables noise reduction initiatives to be undertaken for areas further away from airports such as flight path changes and respite. It would help more people who are 'annoyed' and suffer nuisance by aircraft noise. To illustrate this point with Gatwick Airport (see figure 6, Noise Contours around Gatwick Airport) the size of the area impacted by aircraft noise levels above 45 decibels (45dBA Lden) is around 409km^2 compared to around 75Km^2 area impacted by aircraft noise levels above 55 decibels (55dBA Lden) That makes it more than 5 times larger[4].

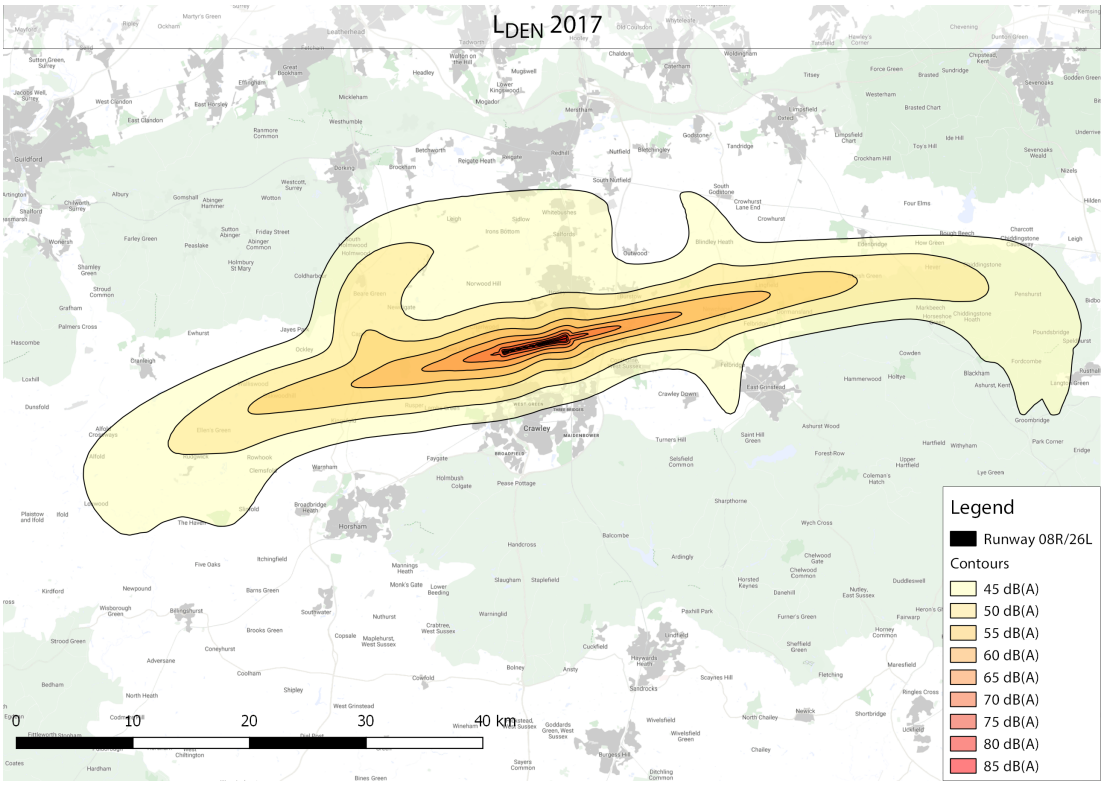

Figure 6: Noise contours around Gatwick Airport (Source: To70)

In 2013, Gatwick changed flight paths as part of its Approach Stabilization Initiative. The arrival flow narrowed in 2015 compared to 2012. This led to a large volume of noise complaints. The shift in the 48 decibel (48 dBALden) contour shows that the concentration of flights had the largest effect in the lower noise levels (See figure 16, Difference between Lden contours 2012 and 2016) This reinforces why modelling, reporting and acting on lower noise levels is important[5].

[2]Annoyance from transportation noise: relationships with exposure metrics Ldn and Lden and their confidence intervals. Miedema and Oudshoorn 4,s.l. Environmental Health Perspectives 2001, volume 109.

[3]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.

[4]CPRE Aircraft Noise Study, Findings Report, To70, August 2019. [1]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.

[5]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.

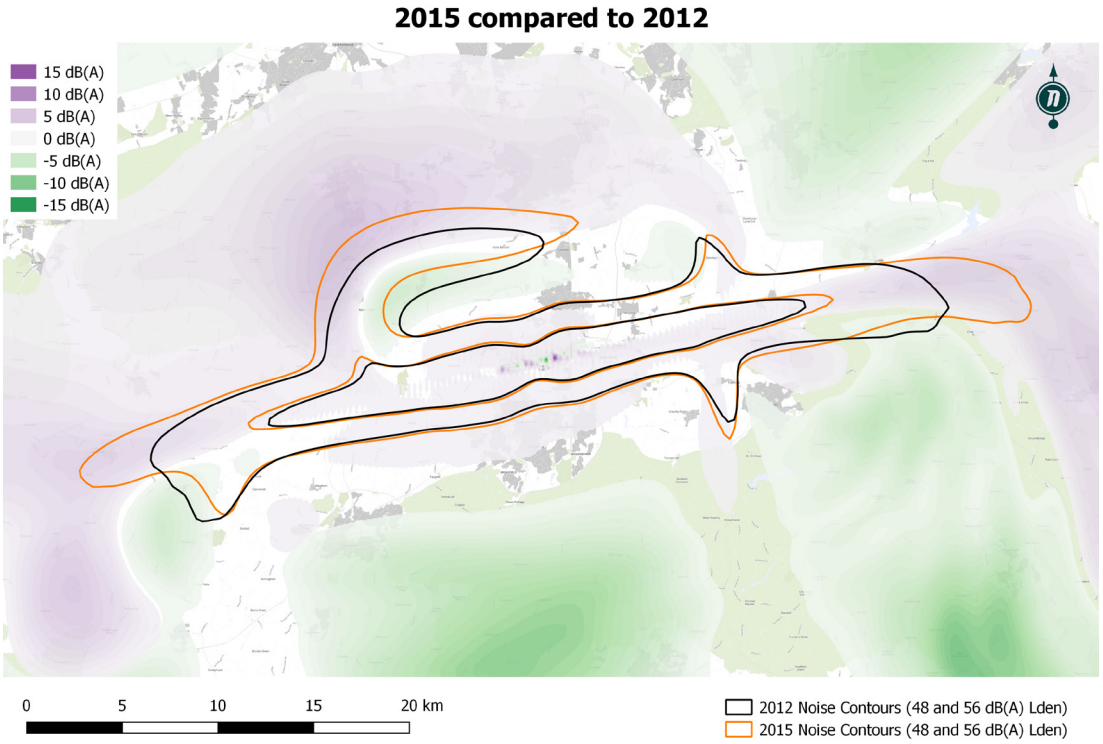

Figure 16: Difference between Lden noise contours for 2012 and 2015

If regional airports are allowed to expand and increase the number of flights, then this could cancel out any noise reduction benefits to local residents through quieter planes. This will be felt particularly at the beginning of the night-time, since around these hours airports often are not yet operating at maximum capacity.

Research shows that we are becoming more sensitive to aircraft noise[6] – the noise levels at which 25% of people are 'highly annoyed' has decreased over the last 50 years. Nowadays, lower noise levels are making us 'highly annoyed.' This is illustrated by the fact that although aircraft have become quieter over the last decades, opposition to aviation expansion has grown.[7]

The World Health Organisation (WHO) published the Environmental Noise Guidelines for the European Region in 2018. In this report the WHO recommends reducing aircraft noise levels to 45 decibels in the day (45 dBALden) and 40 decibels at night (40dBALnight) since higher levels are associated with adverse effects on sleep and health. This is much lower than the reporting threshold of 55 decibels (55dBALden) used by the UK government.[8]

We believe that the UK government should monitor and report at lower noise levels in the UK as this better reflects people's experience of aircraft noise and enables appropriate noise reduction initiatives to be undertaken.

[6]Pesonen, Kari, Study of the effects of aircraft noise, Helsinki: Kari Pesonen Consulting Engineers – Finavia 2018.
[7]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.
[8]World Health Organisation. Environmental noise Guidelines for the European Region. Copenhagen: World Health Organisation 2018.

Noise Tolerance and Expectations

The effects of noise on people can be seen as physiological (for example, hearing impairment, cardiovascular disease) and behavioral (for example, distraction, disruption, disturbed sleep.) However, there is not an absolutely linear relationship between noise levels and annoyance as lots of factors affect how annoying we find aircraft noise. These include fear (for example about climate change or safety) trust (how much people trust a local airport) and expectations. A significant issue in terms of expectations is choosing where to live. If you have decided to live somewhere with certain expectations of the quality of life and 'quiet' you will experience noise as much more annoying than if you were expecting it.[9]

Aircraft have become quieter over the past decades. This technological improvement cancels out the large growth in passenger movements which many airports have experienced. The effect of this is that the areas of noise footprints at most major airports have decreased or stabilised over time. Despite this decreasing noise exposure, the reactions of the communities and resulting political opposition against airport operations all show that annoyance is increasing.[10]

There are many factors which drive annoyance. This increased annoyance could be an indication that the attitude towards noise itself has changed or that people are more annoyed due to the frequency of overflying aircraft. However, the numerous socio-psychological factors will also play a role. Some communities do not trust the airport operator and/or airline statements, reports and commitments. The reach of social media and the availability of information through flight tracking apps and other data sources means that information and opinion can quickly shape views. Besides mistrust, the quality of life expectations and the quality expectations people set for the environment are increasing.[11]

Due to all these factors, annoyance due to aircraft noise is something which requires and approach on multiple fronts where industry and government conduct effective noise management. This should provide solutions for all involved stakeholders and a new perspective for the future. Alongside the technical noise reduction policies, non-acoustic/ socio-psychological factors should be given a raised priority in the design of noise management strategies.

[9]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.
[10]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.
[11]CPRE Aircraft Noise Study, Findings Report, To70, August 2019.

Aviation and Climate Change

In June this year, the UK legislated for an economy-wide target of net zero greenhouse gas emissions by 2050. In September, the Committee on Climate Change (CCC) said that emissions from aviation and shipping can and should be formally included in this target through secondary legislation. This is particularly important given that, in the CCC's view, aviation is likely to be the largest emitting sector by 2050 even with strong progress on technology and limiting demand. The Committee states that in order to achieve net zero the aviation sector must go beyond delivering more efficient planes and lower carbon fuels, but also limit passenger growth to no more than 25% above today's levels. Technologies which aim to remove CO2 from the air will only offer a limited solution to the scale of the challenge.

A range of suggestions are given by CCC to manage passenger growth, including carbon pricing, a frequent flyer levy, fiscal measures and the control of airport capacity. In the CCC's advice to the government the planned additional airport capacity at London airports (including the third runway at Heathrow) is likely to leave at most very limited room for growth at non-London airports.

The CCC wants to see aviation emissions included within UK carbon targets via secondary legislation (as well as within agreed international policies) believing this will increase confidence that the UK is appropriately prioritising the reduction of aviation emissions. The Aviation Strategy will need to reflect this commitment to achieving net zero emissions. The CCC also calls on government to assess its airport capacity strategy in light of the issues around reducing emissions. Several UK airports, including Gatwick Airport, are currently pursuing plans for growth beyond the limits set out by the CCC.

In July, Gatwick Airport published its Masterplan setting out its intention to progress detailed design and development work to bring the existing standby runway into regular use alongside the main runway, while continuing to safeguard land for an additional runway to the south.

Growth projections underpinning the master plan suggest that use of the standby runway could see passenger numbers grow to 70 million passengers per annum (mppa) by 2032/33, a 53% increase on the 45.7 million passengers who used the airport in 2017/18. Aircraft movements are set to grow at a slower rate due to an estimated 10% increase in the average number of passengers per plane, but by 2032/33 they could reach 390,000 movements per annum, around 39% more than the airport handled last year. While the airport says it has no immediate plans to seek permission for an additional runway, the master plan suggests that if it's built, the airport's capacity could eventually reach 95 million passengers per annum.

Research by the AEF shows that although the master plan does point to an increase in the airport's carbon emissions from 0.77MtCO_2 in 2017 to 0.95MtCO_2 in 2028, this assessment is an underestimation. It is limited in both scope and duration: the analysis shows the emissions that Gatwick is directly responsible for (such as fuel used by vehicles at the airport, and the electricity purchased), as well as indirect emissions from passenger journeys to and from the airport and staff commuting. Aircraft emissions are also included in this calculation, but crucially, only for the landing and take-off cycle, capturing the flights emissions below an altitude of 3,000 feet only. The majority of in-flight emissions, those produced in the climb and cruise phases, are excluded. It also fails to look beyond 2028 which limits its relevance when it comes to analysing how expansion could impact the UK's ability to reach net zero emissions by 2050.[12]

[12]Why Gatwick expansion adds to the aviation carbon headache: News from the AEF, Aug 15 2019
[13]Why Gatwick expansion adds to the aviation carbon headache: News from the AEF, Aug 15 2019

The Department for Transport's 2017 UK Aviation Forecasts for air passengers, aircraft movements and CO_2 emissions at UK airports, provide better evidence for the likely carbon impacts of expansion out to 2050. Unlike Gatwick's estimate, the DfT forecasts calculate the emissions for the entire flight and attribute them to UK airports on the basis of all departing flights. In a 2050 scenario where Heathrow builds and operates a third runway, Gatwick Airport (without using its standby runway), is assumed to handle 52 mppa, served by 297,000 aircraft movements annually, and would overall generate 2.7MtCO_2.[13]

Assuming Gatwick's standby runway continues to serve a similar range of destinations with the same aircraft fleet mix, and extrapolating the data from the DfT's scenario and applying it to an increased passenger throughput of 70mppa, this would equate to 3.63MtCO_2 in 2050, an increase of nearly 1MtCO_2. This may prove to be a conservative figure if Gatwick develops a wider range of long-haul destinations than assumed by the DfT model, or if its passenger numbers increase beyond 70mppa between 2033 and 2050. It is also dependent on delivery of a large number of modelling assumptions including the application of a carbon price that reaches £221 per tCO_2 by 2050 (substantially higher than the carbon prices that apply to aviation today, or that are likely to apply in the coming years) and a 48% improvement in aircraft efficiency between 2016 and 2050.[14]

This will threaten the UK's ability to meet its climate target. If we are to achieve this goal, then further runways should be ruled out on climate grounds.

Aviation and other air pollutants

The EU 2008 Ambient Air Quality Directive sets legally binding limits for air quality and limits for air pollutants that affect public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO_2). These limits were supposed to be achieved by 2010 but the government, in spite of legal challenges made by Client Earth, has still yet to comply with them. The problem is worsened at airports, in that not only are there pollutants from the aircraft itself, in take-off and landing and ground running but in the road traffic which airports attract. There is considerable evidence that air pollution can cause health problems ranging from increased risk of heart attacks to Alzheimer's disease. There is a debate about how much pollution is caused by aircraft and at what height it ceases to be a problem. There is also concern as to whether PMs are emitted from any height. There is a need for urgent and full research in this area.

[13]Why Gatwick expansion adds to the aviation carbon headache: News from the AEF, Aug 15 2019
[14]Why Gatwick expansion adds to the aviation carbon headache: News from the AEF, Aug 15 2019

Conclusions and recommendations

Other European countries monitor and report at lower noise threshold levels than the UK as this better reflects people's experience of aircraft noise. However, tolerance to aircraft noise is about more than the noise level, non-acoustic, socio-psychological factors play a key role, including expectations - such as the perceived 'tranquility' of the countryside and how much you 'trust' an airport operator.

The CCC has recommended that the government plans for international aviation to achieve net-zero emissions by 2050 and that this should be reflected in the government's forthcoming Aviation Strategy. The CCC states that it will be necessary to reduce actual emissions from the aviation sector. Until now, there has been a natural cap on aviation emissions due to runway capacity. If greater capacity is supported, then there will be a significant growth in carbon emissions.

We recommend that;

1. The UK should monitor and report at lower noise threshold levels as this better reflects people's experience of aircraft noise. Non acoustic, socio-psychological factors should be given a raised priority in the design of noise management strategies.
2. Government should commission independent research into the impact of aviation noise on health, especially in relation to night flights, in line with recommendations by the World Health Organisation (WHO)
3. The Independent Commission on Civil Aviation Noise (ICCAN) should be given statutory powers so that communities develop more trust in the aviation industry. ICCAN should become an ombudsman so that complaints can be dealt with in an independent way.
4. The government should include aviation emissions within the net zero greenhouse gas emissions target as recommended by the CCC and this should use a consistent approach that includes emissions above 3,000ft and those linked to ground - based operations. Further aviation expansion should be ruled out on climate grounds.

Acknowledgements

This report was produced by the CPRE SE region Network Aviation Group (CPRE NAvG) which is comprised of all CPRE county charities in the South East impacted by aviation, including CPRE London. CPRE would like to thank To70 for their work in conducting the research underpinning this summary, consistently collaborative approach and willingness to work within pressured deadlines without compromising on quality.