

Draft Aviation Policy Framework: consultation response from the Aviation Environment Federation



31st October 2012

The Aviation Environment Federation (AEF) is the principal UK NGO concerned exclusively with the environmental impacts of aviation. Supported by individuals and community groups affected by the UK's airports and airfields or concerned about aviation and climate change, we promote a sustainable future for aviation which fully recognises and takes account of all its environmental and amenity affects. As well as supporting our members with local issues, we have regular input into international, EU and UK policy discussions. Last year we acted as the sole environmental and community representative on the South East Airports Taskforce. At the UN we are the lead representative of the environmental umbrella organisation ICSA which is actively engaged in the current talks aimed at agreeing global climate measures for aviation.

AEF submitted a detailed response to the Government's scoping document consultation and we have not attempted to cover all the ground again although it still forms important background to this consultation response. We have followed the form of the consultation questions in preparing our response, but the fact that we wanted to submit standalone papers meant that it has not been possible to use the online form.

Chapter 2: The benefits of aviation

Connectivity:

Do you agree with our analysis of the meaning and value of connectivity, set out in Chapter 2?

AEF supports the statements in the consultation that: "London is an exceptionally well served capital city" and that "The UK is currently one of the best connected countries in the world."

AEF also agrees broadly with the meaning of *aviation* connectivity as described in section 2.14, namely that it has two key elements - destinations served and frequency of flights.

There are a number of caveats to this however:

1. Connectivity can take many forms, including other transport modes such as rail (with Eurostar and the Channel Tunnel connecting the UK to many western European cities), or transport replacement such as videoconferencing. In our response in October 2011 to the Government's scoping document, we cited evidence from WWF-UK suggesting that while flying has traditionally carried prestige among business travellers, many UK businesses are finding that alternatives can be more efficient in terms of time and cost as well as environmental impact, causing what seems to be a genuine shift in travel behaviour. This may help to explain why both

the number of trips taken from the UK abroad for business, and the proportion of flights taken by business, has fallen in recent years¹.

2. The consultation fails to clarify how the number of “destinations served” should be assessed. Subsequent paragraphs imply that the correct metric is the number of direct flights to a particular destination and that direct flights are better than flights which involve a change. AEF does not accept that this is necessarily true.

There will never be more than a very small proportion of city-to-city or airport-to-airport pairs that have direct connections. To travel between the great majority of pairs will always involve a change of plane. This is not always a disadvantage, however. It can lead to a more frequent and cheaper service between cities than a direct low-volume service would because, when a journey involves a change, the individual legs of the journey are typically high frequency, competitive routes. It is already possible to travel from any UK airport to any other airport in the world suggesting that in fact, we have full connectivity.

The Government’s draft aviation policy states one of its aims as ensuring “*that the UK’s air links continue to make it one of the best connected countries in the world. This includes increasing our links to emerging markets so that the UK can compete successfully for economic growth opportunities.*” But no evidence is presented to suggest that the UK cannot compete if a business traveller has to change plane.

3. The consultation confuses and conflates connectivity and hub airports issues.

For those passengers flying to or from an airport in South East England, the fact that it operates as a hub as well as a terminating airport is of little relevance. Meanwhile, for those who do not live or work in South East England but want to do business abroad, having a hub airport in the UK is unimportant. There is no generalised advantage for someone flying from, say, Aberdeen to change plane at Heathrow or a Thames estuary airport compared with changing at Helsinki or Hong Kong.

As a hub airport in South East England confers no particular benefit for passengers travelling to or from South East England and confers no particular benefit for passengers travelling to or from other parts of UK, it can be safely concluded there are no great benefits of larger or expanded hub airports or hub capacity for UK passengers. The need for passengers and for the UK economy is adequate *terminating* capacity.

There may well be a benefit for certain airlines or airport operators if passengers change plane at a particular (South East England) airport. However, this is a completely different matter to benefits for passengers or general UK economic benefits arising from business travel. Similarly, Heathrow’s hub operations may help improve connectivity for people flying between other countries, but this should not be a primary aim of UK aviation policy. Virgin Atlantic, for example, recently announced a new service from Delhi to New York’s JFK via Heathrow, following the success of its Delhi-Newark route which also connected at Heathrow. In direct contradiction of the concept that direct routes are always preferable, Stephen King, Virgin’s

¹¹¹ February 2012 Health Protection Agency *Global and UK Travel Trends 2010*
http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317132797054

general manager in India said: "Our increasing share to Newark shows that passengers prefer breaking the journey in half, stretching their legs and indulging in some duty-free shopping. We're looking forward to making this new service to JFK a success."²

Finally, attracting foreign passengers to change planes at a hub airport in South East England justifies the selection of larger aircraft which subject communities to proportionately more noise and pollution. There is little offsetting gain to the UK economy because, as noted previously, the extra passengers are not actually travelling to or from the UK and therefore contribute little if at all to the UK economy.

The argument made by supporters of hub airports is that, by attracting foreign passengers who are not terminating in the UK, they make the demand for potential (direct) routes larger. They can therefore make a route viable which it would otherwise not be. We have seen little evidence to support this claim, however. In fact, while Heathrow's passenger numbers have steadily increased over time, even under its movements cap, the number of destinations it serves has actually decreased.

Any other comments:

Do you have any other comments on the approach and evidence set out in Chapter 2?

Having a chapter titled 'benefits of aviation' indicates a fundamental bias in the DfT's approach to consideration of aviation's economic impacts. In our response to the scoping document consultation, AEF wrote:

Aviation often provokes strong feelings both among the industry and among communities affected by airport expansion, and AEF believes it is essential for Government to take this opportunity to assess dispassionately the true impacts of the sector – environmental, social, and economic. This is particularly important when considering the economic impacts because there is a history of large economic benefits from aviation being claimed without good evidence.... To illustrate the point, it is worth noting that not all areas of government policy are approached using this framework. The Government's policy on alcohol, for example, is not routinely prefaced with a preamble about the social benefits enjoyed by drinkers, how many jobs the industry generates for the UK, and the extent to which drinking facilitates trade.

We continue to feel concerned about the extent to which economic benefits from aviation and, now, from hub airports in particular, are assumed rather than demonstrated. Paragraph 2.1 of the draft framework, for example, states that "Responses to the scoping document ... clearly demonstrated that the economic benefits are significant." Yet no indication is given as to which evidence the Government found convincing on this point.

Chapter 2 extols the economic benefits of aviation, but this discussion in fact has no direct relevance to strategy. All the claims do is to indicate there are economic benefits in having some level of air

² <http://www.southalltravel.co.uk/news/India/90402225/Virgin-Atlantic-to-Start-Flight-from-Delhi-India-to-JFK.html>

travel. Nowhere is there evidence that we need more and more air travel to support the economy. Nowhere is the key issue addressed that productivity of business and economic growth rely centrally on improving productivity and reducing inputs, be they materials, energy, labour or services. Nowhere is there any evidence as to why completely different rules should apply to air travel compared with other inputs to industry and commerce.

Although claims are repeatedly made about the economic benefits of connectivity and international trade, it is important to note that business travel only represents only around 21% of UK air travel. Most airport capacity, most of the impacts and most of the forecast growth are for leisure.

Business growth is non-discretionary and price inelastic while leisure travel is the reverse. This means that if there were any capacity constraints or rise in prices, the volume of leisure travel rather than business travel, would be affected.

In these circumstances, it is important that the framework is clear as to what any growth of capacity is intended to achieve. Impacts of different policies or scenarios on business travel need to be highlighted.

If a proper assessment of economic impact of a sector is to be made, it is essential to take into account its taxes and subsidies. Aviation is, as we have noted many times in the past, hugely under-taxed in comparison with other sectors of the economy. There is no tax on fuel, no VAT on tickets or aircraft and no compensation for the noise, air pollution and climate change impacts. If tax were charged on aircraft fuel at the rate it is charged on petrol, this would raise at least £9 billion pa, even after offsetting APD.

Instead of properly acknowledging that economic benefits have been over-claimed in the past, the Framework makes no mention of why the figure for the Government's estimate for number of people directly employed by the sector in the UK has gone down – even in the short period since publication of the scoping document – by 40,000 (from 160,000 to 120,000), while quietly introducing elsewhere a figure for the number employed in aerospace sector manufacturing.

While we welcome the acknowledgment in the Framework that respondents had highlighted the existence of the tourism deficit to which aviation contributes, we are astonished that the Government's rebuttal of this notion appears to rest at least in part on the fact that industry sources have recently highlighted a figure of £27 billion in pre-holiday sales, stating that "outbound tourism supports UK-based jobs in the travel and airline industry and boosts high street consumer demand before trips are made. The latter has been valued at around £27 billion per year".

The original ONS document from which this figure has been lifted, however (referenced in footnote 19) makes clear that the majority of this spending – 59% – was on air fares. As these are increasingly paid for online, and not always to UK airlines (ONS states "we have used all IPS data, not making any distinction between expenditure paid to UK-based carriers (57 per cent of the total) and that paid to those overseas") this is hardly the boost to 'high street' spending that is implied.

Government policy on travel demand

AEF considers that an essential part of the aviation framework should be a clear statement on whether or not the Government is reverting to a 'predict and provide' policy for aviation.

In the past, there was an assumption that the Government's role in relation to aviation was to ensure that all forecast travel demand was met. By the time of the 2003 Air Transport White Paper (an expansionist aviation policy that has been, rightly, discredited by the current administration for failing to give sufficient weight to environmental impacts) the Government had moved away from the promise to meet all demand, as evidenced by the clear distinction drawn between constrained and unconstrained demand scenarios.

The expectation that publication of this draft Framework would be followed by a call for evidence on aviation capacity issues has led, perhaps, to the fact that no direct reference is made in this document to the Government's aviation demand forecasts. Instead, confusingly, reference is made without quoting any supporting evidence to "the very difficult capacity challenge at our biggest South East airports, which is set to get progressively worse in the medium and longer term without effective action."

No mention is made of the fact that passenger demand has been consistently over forecast by Government modelling such that on every occasion since 2003 that the forecasts have been updated, they have been downgraded, with the current forecasts indicating that even in an unconstrained scenario, there is sufficient airport capacity to meet all demand until nearly 2030. This comes as no surprise – we have frequently argued that the forecasts have been inflated as a result of unrealistic assumptions about future oil prices, for example. With the economy having remained in recession until very recently, it is almost inevitable that the next review will see them downgraded further still. Freight transport, formerly predicted to surge, has in fact flatlined.

We have two concerns about the current situation:

- (i) Reference is made in Annex E to the role of forecasts in airport master plans, which the Government hopes will play a more important policy role. We return later to our very significant concerns about this proposal. But it is worth noting here that if the Government demand forecasts have proved to be too high, airports' own forecasts have been off the scale. In their desire to increase their own companies' value and to impress shareholders, this seems almost inevitable. Government forecasts have an important role to play as a more independent and realistic source of information and this should be clearly stated in the policy.
- (ii) With capacity questions now being delegated to the Howard Davies Commission, the role of the aviation framework in setting out clearly the conditions within which these questions must be considered becomes even more important. The policy should state unequivocally that individuals' demand for air travel must be balanced against society's collective demands for clean air; for homes, schools and workplaces that are not spoiled by intrusive noise; and for effective action on climate change. The question of whether all aviation demand should necessarily be met, or whether alternative forms of connectivity might be more appropriate, is currently unanswered, leaving a significant policy gap.

AEF's view is that the current media frenzy over the supposed airport capacity 'crisis' is based on industry marketing rather than factual considerations such as official demand forecasts and that this is stoking political debate in an unhelpful way. While we accept that capacity questions are beyond the scope of this consultation, we have attached a short briefing we have written on the overall question of demand and capacity.

Chapter 3: Climate change impacts

Do you have any further ideas on how the Government could incentivise the aviation and aerospace sectors to improve the performance of aircraft with the aim of reducing emissions?

Section 3.14 of the draft framework states: “As noted in responses to the scoping document, airlines already have a considerable cost incentive to reduce fuel consumption, which directly reduces emissions.” We agree. The development of new technology that reduces fuel burn, whether funded by the industry itself or by governments, has a direct financial benefit for airlines given that around 30% of their costs arise from fuel use (section 3.30).

Even with this strong built-in incentive, however, recent analyses by both the Department for Transport and the Committee on Climate Change have predicted very low rates of aircraft efficiency improvement over coming years. The latest DfT forecasts actually predict a *worsening* of aircraft efficiency over the next decade to 2020, with an average annual efficiency improvement of just 0.4% forecast for the whole period 2010-2030 under the central forecast. The text notes that these figures are significantly lower than in older forecasts, which assumed “that soon after 2000 new aircraft models beyond the mid-1990s types ... would be entering the fleet. With the exception of a limited number of A380s there has been no introduction of significant new types in the past decade. These earlier forecasts would, for example, have been based on the assumption that Boeing 787s (and possibly A350s) would have, by now, replaced many less efficient medium and long haul types. Entry into service may have lagged almost 10 years behind the expectations in the early 1990s.”

This tells a very different story from the one presented in the framework. Specifically, it suggests that:

- (i) The IATA target of 1.5% (referred to in section 3.10) is unlikely to be achieved in the UK markets without additional measures
- (ii) Efficiency gains achieved in the past (referred to in section 3.31) have increasingly little relevance to the future.

Our own analysis indicates that in fact, even the 70% improvement since the 1970s which is referred to in this document, and frequently by the aviation industry, may have come as much from increasing aircraft load factors as from technological improvements. Alternatively if load factors are not taken into account, independent sources suggest much lower efficiency improvement figures. The way in which this claim is presented in section 3.31 is therefore misleading on two counts – both past achievement and likely future improvements. Analysis of this is set out in the Appendix to our response.

Moving beyond these low – even negative – rates of efficiency improvement will clearly require additional action. AEF, through our participation in the International Coalition for Sustainable Aviation, is actively supporting the efforts at the UN to agree a CO₂ standard for aircraft. We are also working actively to support the development of market-based measures at UN level to tackle aviation emissions, which would create an additional incentive for airlines to use the most efficient aircraft.

As indicated above, fuel efficiency per passenger km can be improved through operational as well as technological measures. At EU level, a move towards auctioning of slots and review of 'use it or lose it' rules would help to ensure that aircraft were not flying half empty just in order to retain rights to their slots. In the UK, replacing Air Passenger Duty with a tax per plane would help to further disincentivise empty seats.

Do you have any other comments on the approach and evidence set out in Chapter 3?

Overall, the way in which climate change is addressed in the Framework, as well as in this consultation, is such that the significance of the challenge, and the potential for UK-led action, are both heavily underplayed. The opening statement, for example, that "Globally, the aviation sector is responsible for about one to two per cent of greenhouse gas (GHG) emissions" seems to us to deliberately present the situation as one of relatively little global importance, not least by using a metric (GHGs as defined by the Kyoto Protocol) that is irrelevant to aviation. We note that in the past DfT has sought to account for non-CO₂ emissions by use of a CO₂ multiplier. While we fully understand the reluctance of climate scientists to endorse an approach that they regard as insufficiently robust, we continue to feel that such a measure creates less of a distortion in policy terms than omission of any accounting for aviation's non-CO₂ effects.

As noted above, AEF is, as part of the International Coalition for Sustainable Aviation, actively supporting efforts at the UN to agree a global approach for tackling aviation emissions. In relation to EU ETS, we agree with the implication in paragraph 3.16 that the scheme will not, as it currently stands, deliver "targets consistent with the internationally agreed goal to limit the rise in average global temperature to two per cent", and that participation in EU ETS will therefore be insufficient in ensuring "a fair contribution" from the aviation sector to that goal. Notwithstanding these concerns, we have been a vocal supporter of aviation's inclusion in the scheme, as a step towards bringing aviation into line with wider climate ambitions, and we were one of a number of organisations providing evidence in court in support of the EU when it was challenged over the system's legality. Neither international measures nor the EU ETS, however, obviate the need for aviation to be appropriately accounted for under the UK's climate change targets and programme.

Aviation and the Climate Act

When the Climate Act became law in 2008, the EU ETS had already been operational for three years. If there was an argument that, as the framework puts it in section 3.24, a national target would "result in a higher cost to achieve the same level of emission reductions as the EU ETS by itself", this was clearly deemed by politicians of the time, many of whom are now in Government, to have been overridden by other strong arguments in favour of a UK law setting binding UK-specific carbon budgets and targets.

The objective of the Climate Act was to ensure that the UK played its fair part in achieving emissions reductions that would limit the chance of the world exceeding 2 degrees of warming to not more than 50%. An *economy-wide* emissions cut of at least 80% was determined as the minimum level of ambition required to achieve this. Inclusion of aviation and shipping in the 2050 target is therefore essential to the integrity of the Act.

To ensure that the UK was not placed at an economic disadvantage compared with other members of the EU, the Committee on Climate Change developed a system of 'interim' and 'intended'

budgets, with the intended budget being pursued only if the EU were to move to a 30% reduction target by 2020. UK economic interests have thus always been protected by the CCC's approach to implementation of the Climate Act.

When the Act was legislated in 2008, questions remained about how best to account for international aviation and shipping emissions, leading to their being excluded from carbon budgets in the short term. Nevertheless the Act made clear that they should be included in future and preferably by 2012. The Committee on Climate Change has advised that there are no longer any good reasons for excluding these sectors, whose emissions are very likely to represent an increasing percentage of the UK total, from future carbon budgets.

AEF is very disappointed that the Government has failed to determine its position in relation to the possible inclusion of aviation in carbon budgets in time for consideration under this framework. As a decision must be taken by the end of this year, by the time the framework is finalised next March we will know what stance has been taken. We cannot understand why the consultation does not, at the very least, invite comments from respondents on this key question. We understand that many industry representatives as well as NGOs would support the sector's inclusion in the Climate Act, yet the draft framework implies concerns from Government about doing so.

In May this year AEF published a briefing paper considering the advice from the Committee on Climate Change in relation to aviation's possible inclusion in the carbon budgets. This is appended to our response to this consultation. Key aspects of the CCC's views include the following:

- (i) Aviation should be included in all future carbon budgets. In line with other sectors in the EU ETS, inclusion should be on the basis of the UK's share of the sector's EU ETS cap. No additional costs would therefore be generated for UK aviation as a result of inclusion in the Act.
- (ii) Because CCC has already been required under the Act to take account of aviation and shipping emissions when setting carbon budgets for other sectors, formal inclusion of these sectors would generate no additional costs for other sectors. Since the 'taking account requirement' applies throughout the period of the Act, CCC's conclusion in relation to costs applies as much to future budgets as to currently legislated budgets.
- (iii) International measures to constrain aviation emissions are in the longer term preferable to measures applying only in the UK or only in the EU. As well as actively supporting the development of such measures, the UK should plan on the assumption that absolute emissions from UK aviation are no higher in 2050 than they were in 2005.

AEF's own view, as set out in the conclusion to our attached briefing on this subject is as follows:

AEF strongly supports CCC's recommendation that aviation be included in the UK's carbon budgets. We also support the recommendation that the appropriate figure to be entered into these budgets is the UK's share of the EU ETS cap for aviation, namely 31 MtCO₂e, though we would support a tightening of this cap in future which would, in turn, require a lower figure for aviation to be entered into the UK's carbon budgets. Finally, we strongly support the setting of a complementary target or planning assumption relating to actual (gross rather than net) emissions from UK aviation. However, we regard 35 MtCO₂e – a level 4 Mt higher than the figure to be entered into the carbon accounts – as insufficiently stringent.

UK action in the international context

As stated above, AEF fully and actively supports action at the international level to tackle aviation emissions. We note that the Climate Act itself is a unilateral step that represents part of an appropriate programme of UK action towards achievement of global goals. The Act has not only generated a great deal of international interest but has also become a tool of diplomacy in the context of foreign policy negotiation.

Section 3.6 of the framework states “Flights departing from UK airports to international destinations account for about 95 per cent of UK aviation emissions”. It then leaps immediately from this statement of fact to a conclusion that “measures to tackle CO2 emissions from UK aviation need bilateral or multilateral agreement.” Not only is this logic faulty, it is also inconsistent with the view of the UK Government in relation to the EU’s decision to apply EU ETS provisions to all arriving and departing aircraft. It is now more clear than ever that this step did not have (or require) unanimous multilateral agreement!

Inclusion of aviation in the UK’s carbon budget, combined with appropriate assumptions about future gross levels of aviation emissions, would represent a proportionate step towards securing an effective package of emissions mitigation measures for the sector that would attract no extra costs and would protect the integrity of the Climate Act. Unlike the inclusion of emissions from all arriving and departing aircraft in the EU ETS, clearly no bilateral or multilateral agreement would be expected for the Government to take this step.

Chapter 4: Noise and other local environmental impacts

Do you agree that the Government should continue to designate the three largest London airports for noise management purposes? If not, please provide reasons.

AEF considers that the current noise management regime for Heathrow, Gatwick and Stansted is inadequate in that it leaves large numbers of people highly annoyed and exposed to noise at levels deemed risky to health by the World Health Organisation. Nevertheless, it does on balance have advantages over the alternative – relying on local authorities to impose controls. First, it allows for regular review in terms of whether the conditions remain valid rather than relying on opportunities becoming available through the planning system to vary any planning controls, and second it sets a benchmark (albeit one we consider inadequate) against which noise measures at other airports can be considered.

Communities at many airports outside the South East believe that the noise they experience would be better managed by Government than by self-regulation or by their local authority through planning conditions. Some airports have effectively no noise or movement limits or, as in the case of Luton, for example, have noise limits that were set in good faith but have turned out to be too generous ever to have effect. East Midlands Airport generates a significant night noise problem, while evidence from Belfast City Airport Watch suggests that far larger populations are exposed to noise above 57 Leq as a result of Belfast City’s operation than at either Gatwick or Stansted. There may well, therefore, be good grounds for designation of some airports outside the South East.

Do you agree with the Government's overall objective on aviation noise?

We agree with the statement made in the draft Framework that a measurable objective on noise is vital. We do not accept that the purpose of this should be to provide “evidence to support decisions on growth”. Instead, the objective should have at its core the protection of both health and quality of life through appropriate controls on aircraft noise. Reference to ‘limiting’ noise is meaningless without the specification of any limits, while no explanation is provided of the cases in which noise reduction should be deemed possible or not.

We are pleased that section 4.4 states that the Government wants ‘a tougher noise management regime’. We feel that the proposal to retain the noise objective from the previous policy is inconsistent with this aim.

Do you agree that the Government should retain the 57 dB LAeq,16h contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance?

No. We strongly disagree with this proposal and believe there is no longer any sound evidence base for such a policy.

In our response to the scoping study consultation we said:

We are disappointed that no work has been undertaken to further the conclusions from the Attitudes to Noise from Aircraft Sources in England (ANASE) research. The findings of the ANASE study confirmed that:

- a greater percentage of people are highly annoyed by aircraft noise at any given level when compared to the previous study undertaken in 1982 and published in 1985³; whereas the Department for Transport currently takes noise into account above 57 Leq dBA, this threshold would appear to closer 50 dBA Leq based on an equivalent percentage of the population being highly annoyed today;
- annoyance is strongly influenced by the number of noise events;
- aircraft noise at night is more annoying.

The Government at the time accepted that people were more annoyed, but in deciding how to respond to this conclusion relied on a peer review critique that claimed that the study was not sufficiently robust to be used to inform policy. AEF was a member of the ANASE steering group. We agree that some of the CAA/BV criticisms of ANASE were technically valid, but they also applied (with greater force) to the earlier 1982 ANIS study on which current policy is still based. Having learned from international best practice and benefited from extensive steering group and internal peer review, the ANASE study was in many ways technically superior to the 1982 ANIS study.

We referred to research from elsewhere in Europe that has reached similar conclusions as the ANASE study, as summarised in the European Environment Agency’s *Good practice guide on noise exposure and potential health effects*, Technical report No 11/2010, and we are pleased to see this study referenced in Appendix D of the draft framework. It seems extraordinary to us that the

³ In the 1982 study, 39% of respondents were annoyed at 57 Leq. This has increased to 53% today.

Government proposes to retain a noise indicator that has been clearly shown by evidence such as this to be outdated. If the Government does not for whatever reason feel confident in setting out what alternative limits should apply, the framework should at least set out a clear timetable of work for reaching a conclusion to the question that the ANASE study was undertaken to address.

As set out in our response to the scoping study consultation, in the longer term we believe that the Government should aim to comply with the recommendations of the World Health Organisation on protecting communities from the adverse impacts of noise. We welcome acknowledgement in the draft framework of the growing body of research in relation to the impacts of environmental noise on health but we are disappointed that no timetable is set out for translating such research into policy and hope that this can be addressed in the final version of the document.

We very much welcome the recommendation in Chapter 5 of the draft Framework that airports should review how information about noise is presented in order to make it more meaningful and accessible, including the use of “additional metrics to help people to better understand other factors such as frequency and pattern of aircraft movements, the precise tracks used, the average noise of individual aircraft and the highest noise levels which can be expected”. AEF has for some time called for the use of a suite of metrics both for communicating noise to the public and setting appropriate noise limits. We believe that the Government’s recommendation to airports would be more likely to be effectively implemented if a guidance document could be prepared either by the DfT or perhaps in conjunction with the CAA setting out in more detail possible alternative approaches to noise measurement and mapping, with explanation of the contexts in which each of these might be more or less appropriate. We note that PPG 24, which has now been scrapped, contained some guidance on the fact that at smaller aerodromes Leq may be inappropriate.

Do you think that the Government should map noise exposure around the noise designated airports to a lower level than 57 dBA? If so, which level would be appropriate?

Yes. In our response to the scoping study we indicated that 54 Leq should be the minimum requirement for consideration in policy addressing averaged noise and we welcome the proposal to map noise at the designated airports to this level. As indicated above, using the 57 dBA thresholds in the ANIS study as a reference point, the ANASE study suggested that an equivalent proportion of the population is highly annoyed today at around 50 dBA.

Given the UK’s commitments under the Environmental Noise Directive (END), however, with noise action plans for all the designated airports required to reflect the results of the noise mapping undertaken for the END, we consider that noise maps for these airports should also be drawn up using the EU Lden metric, supplemented by separate Lnight maps. A recent consultation by the EC on implementation of the END asked for views on whether there would be any benefits in lowering the reporting threshold to 40 dB Lnight, to reflect the 2009 guidance from WHO Europe in relation to night noise and health. We argued that while there may be a challenge in accurately segregating noise from different sources to this level, there would be value in developing aggregated noise maps that show night noise down to 40dB, without trying to attribute such noise to source at this stage. Lowering the threshold in this way would, we argued, help to demonstrate the relevance of noise mapping in the context of the WHO’s findings, and would help states and regions to identify areas in which further attention may need to be paid to noise impacts.

We support the drawing up of noise maps at the designated airports using the Lden metric, to support the system of mapping and action planning under the END and believe that noise should be mapped to at least 55 Lden and preferably lower. If the UK wishes to retain Leq, it should publish 54 Leq contours in addition.

Do you agree with the proposed principles to which the Government would have regard when setting a noise envelope at any new national hub airport or any other airport development which is a nationally significant infrastructure project?

We welcome the concept of noise envelopes as providing an opportunity for some fresh thinking in relation to how noise limits might be defined. We also very much welcome the proposal that “the benefits of future technological improvements should be shared between the airport and its local communities”. This would suggest that the envelope should shrink with time. If not, the noise benefit will not be protected. It is fair that additional effort by the industry should receive some reward, but we agree that the benefits should be shared. However, for a noise envelope to be introduced only in cases where a significant expansion or new airport was being considered suggests that the concept will have very limited applicability, and very limited credibility with local communities who are likely to see it as tokenistic in the context of significant, inevitable new or exacerbated disturbance.

We are glad that the CAA has been asked to develop possible approaches for defining noise envelopes including as indicated in sections 4.37 to 4.40. We believe that in order to get the most benefit from this work, the aim should be to develop guidance notes on methodologies for defining noise envelopes, which could be adapted for use on a voluntary basis by airports, or by local authorities in the context of planning applications. We accept that the Government is not at liberty to impose new noise restrictions at existing airports, but given the number of cases in which local communities feel strongly that the current situation is not acceptable, we believe that there may well be appetite for this kind of guidance if it could provide a possible framework for consultation and discussion.

In particular, we believe that the evidence in favour of using alternative metrics for aviation noise should be considered in this guidance, with a range of options considered. The fact that “There was a stark difference in views on whether an envelope should include a cap on movement numbers” does not, we consider, provide sufficient reason to reject this as one of a number of other factors in favour of more complicated ways of articulating noise envelopes. If the aim is to provide clarity and certainty to local communities as well as to airports in relation to future disturbance, movements limits should certainly not be discounted at this early stage.

Do you agree that noise should be given particular weight when balanced against other environmental factors affecting communities living near airports?

We note that the principle of prioritising noise is caveated in the framework in relation to exceedences of EU limit values for air pollution and that is a principle we would support. In our response below to the question specifically addressing air quality, we note recent research indicating that air pollution is a significant contributor to mortality even at airports that are not currently

associated with breaches of EU legal limits. To the extent, therefore, that trade-offs may arise in relation to noise and air pollution mitigation, careful assessment should be made of background air pollution levels before assuming that noise reduction should always take precedence.

With respect specifically to trade-offs between CO₂ emissions and noise mitigation in the context of airspace changes, we agree that there is a particular need to address noise impacts. Not only do airlines have a financial interest in reducing fuel consumption, the recent development of the NATS flight efficiency metric 3Di, which incentivises air traffic controllers to provide fuel efficient routings, is likely to entrench efforts to minimise CO₂ in the context of air traffic management, and we agree that there is a danger that noise may not be given the same level of attention.

Elsewhere in our response we comment extensively on the need for effective policy on aviation's impact on climate change. While we welcome efforts by all sectors of the industry to reduce emissions, we note that only a small proportion of the emissions of any flight, but particularly medium and long-haul flights, occur during the take-off and landing cycle. This is, meanwhile, precisely that part of the flight in which the majority of noise disturbance occurs.

What factors should the Government consider when deciding how to balance the benefits of respite with other environmental benefits?

The extent to which noise is problematic is affected by time of day (with noise at night being most disturbing), day of the week (with weekends being the time that many people want to spend at home or in their garden), population density, and land use (with, for example, schools and designated quiet areas requiring special consideration). It is clear that noise controls should be determined on a case by case basis, but that general principles in terms of assessing noise impacts and developing appropriate controls could very usefully be set out by the Government.

Do you agree with the Government's proposals in paragraph 4.68 on noise limits, monitoring and penalties?

Yes. We support all these proposals.

In what circumstances would it be appropriate for the Government to direct noise designated airports to establish and maintain a penalty scheme?

We note that all three of the currently designated airports operate such a scheme. We also note, however, that the Government proposals include a call for increased stringency in relation to penalties. This is something we would welcome. We consider that the Government should set out guidance on an appropriate enforcement regime, which may also have applicability at non-designated airports. Should airports fail to respond appropriately to this guidance, the Government should use its power to intervene.

In what circumstances would it be appropriate for the Government to make an order requiring designated airports to maintain and operate noise monitors and produce noise measurement reports?

As above, we note that all designated airports currently operate noise monitors and produce noise reports. However, we would welcome a more robust approach, as recommended by Government, and hope that guidance will be developed on how this might be achieved. The Government's power to intervene should be exercised if airports fail to respond appropriately.

How could differential landing fees be better utilised to improve the noise environment around airports, particularly at night?

Noise-related landing charges are common at many airports worldwide. However, the use of charges is often revenue-neutral and is based on simple differentiation between ICAO noise certification Chapters. As more aircraft become Chapter 4 compliant, the effectiveness and relevance of such schemes diminishes. Using more complex classifications, such as the QC categories at the London airports, would maintain an incentive in the coming years. Furthermore, some airports around the world successfully add the costs of mitigation, compensation and insulation programmes to their airport charges and use noise-related landing fees to recover these costs, setting the rate annually and in proportion to the costs of a scheme. This enables airports to offer more ambitious and effective schemes (see section below on compensation) or speed up delivery of the programmes. AEF would welcome consideration of such charges at UK airports.

Do you think airport compensation schemes are reasonable and proportionate?

Compensation for property owners

No. Current schemes are inadequate, being both too narrowly drawn and not fully implemented. Insulation schemes are often paid for only in part, and while some funding is made available for double glazing, costs of mechanical ventilation are not covered. We understand that at Heathrow, much of the noise insulation that is meant to be on offer for schools has not been implemented. More importantly, the great majority of people affected by noise at Heathrow – those experiencing noise of 63dB Leq or lower – get no help.

AEF considers that the boundaries for noise compensation should be drawn much more widely. We see no justification for the figure of 69 dB quoted in the draft framework, and believe that noise compensation contours for all airports should mirror the noise mapping work described above. In addition, we note that buildings insulation is only a partial recompense and that outdoor noise remains uncompensated. Supplementary ongoing payments, such as council tax rebates, could improve this situation.

Compensation schemes cannot replace effective noise management policies but are an important part of the package.

The cost of aircraft noise for children's outdoor learning

It has long been known that noise can have a detrimental impact on children's learning in schools. Less often noted is the impact it can have on outdoor learning, despite this being an important part of the curriculum. AEF believes that aircraft noise impacts on school playgrounds and nearby parks

needs particular attention in the context of noise mapping. To ensure that all children can have the opportunity to experience outdoor learning in tranquil environments that are not overflowed, regular trips away from the premises of noise-affected schools should be funded by the airport concerned in order to compensate for the external cost imposed. AEF, together with research and education charity the Airfields Environment Trust, undertook a pilot project in 2011 – Soundscape – to enable children from primary schools in West London to visit a nearby nature reserve. While the feedback from students, staff, and the parents who attended was very positive, the project relied on a one-off grant from Awards for All. The framework should, reflecting text in the 2003 Air Transport White Paper, place a specific requirement on airports to seek opportunities to support and fund similar initiatives in future.

Noise impacts of airspace changes, and their impact on property values

Part 1 of the Lands Compensation Act 1973 enables payment of compensation for any diminution in property values that can be shown to have been caused by infrastructure developments on the ground. In the case of airports, this might be new runways or extended aprons. However, there is currently no recourse to the law if property is devalued as a result of a change in the routing of aircraft such as changes to Noise Preferential Routes. Significant changes in noise footprints may well arise from forthcoming airspace changes, and we are concerned that the potential impact on property values may go unaccounted for.

The aviation policy framework should, we believe, set out a compensation regime for such cases. It should also note the shortcoming in existing legal protections, and should commit to seeking opportunities for a review of the 1973 Act.

Do you agree with the approach to the management of noise from general aviation and helicopters, in particular to the use of the section 5 power?

We very much welcome the fact that noise from general aviation and helicopters is given specific consideration in the draft framework, responding to several of AEF's comments in our response to the scoping document consultation.

AEF has long supported retention of the legal provision in relation to the CAA's section 5 powers and we welcome the fact the CAA's environment programme⁴, published this year, states that:

The CAA will develop a policy for the purposes of section 5 of the Civil Aviation Act 1982. This will set out the factors to be taken into account and the steps to be considered when seeking to minimise the environmental impact of an aerodrome and its operations of an aerodrome.

We hope to have the opportunity to review and comment on the CAA's proposals. As indicated elsewhere in our response, however, we consider that the role of the CAA should be in either informing or influencing Government policy and that it should not itself be regarded as a policy-making body. Ultimately, therefore, the Government should set out the circumstances in which it would consider asking the CAA to implement these powers.

⁴ http://www.caa.co.uk/docs/2248/CAA_and_the_Environment_final.pdf

We are also very pleased that the Government has committed to a review of its policy in relation to noise from helicopters in the context of its review of the 2002 guidance on environmental objectives in relation to the CAA's air navigation functions. In our response to the scoping document consultation we highlighted the recommendations of research undertaken by Defra in 2008 in relation to helicopter noise, and we hope that these will be given careful consideration.

What other measures might be considered that would improve the management of noise from these sources?

In our response to the scoping document consultation, AEF made one specific recommendation in relation to General Aviation noise that we hope that the Government will commit to undertake, namely that the Government should 'provide a commitment to investigate ways of encouraging the fitting of noise reduction technologies such as multi-bladed propellers and silencers to light aircraft, including how the recertification cost and timescale can be reduced.' ICAO noise certification requirements for light aircraft currently lag behind the technologies that are available. While countries such as Germany have introduced more stringent noise certification requirements, ensuring that technologies such as multi-bladed propellers and silencers are widely available for most aircraft types, certification requirements for use in the UK are currently prohibitive, resulting in low levels of market penetration. A review of these requirements would be a practical step that the Government could take which would not require the introduction of any new regulations.

Do you have any further ideas on how the Government could incentivise the aviation and aerospace sector to deliver quieter planes?

Elsewhere in this response we have noted that through selection of a misleading set of statistics, a false impression is given of rapid historical improvements in the fuel efficiency of aircraft, and of similar – if less quickly evolving – improvements inevitably taking place in future. We have some similar concerns in relation to the presentation of information about noise technologies.

Section 4.32 of the draft Framework states that "The European Commission . . . set a noise-related goal whereby the perceived noise emission of flying aircraft is reduced by 65 per cent relative to the capabilities of typical new aircraft in 2000" by 2050. No assessment is provided, however, of whether this goal is likely to be achieved. There is no evidence, for example, that the original ACARE target to reduce noise by 50% by 2020 is anywhere close to being met. It is inappropriate to include this statement without such analysis.

We agree with the statement in section 4.78 in relation to ICAO's approach to standard setting for noise (although the stringency options for the forthcoming Chapter 5 debate have been constrained by the open rotor discussion and do not reflect current technological advances), and the potential for the quota count system to help raise noise standards. We note, for example, that Singapore Airlines demanded when purchasing the A380 that the aircraft be compliant with QC2, even though this involved a trade-off in terms of fuel efficiency.

Do you believe that the regime for the regulation of other local environmental impacts at airports is effective?

Air pollution

The issue of air pollution was recently brought into sharp focus by a report⁵ by researchers at MIT, which found that “UK airport emissions cause about 110 early deaths per year today,” with the figure predicted to rise by 170% by 2030. While Heathrow is currently the only UK airport associated with breaches of the EU legal limits for air pollution, 60 of the 110 annual deaths estimated by the study were linked with other UK airports. Such evidence highlights the need for a review of air quality policy and legislation, much of it agreed many years ago, with a view to securing a tougher framework.

We are very concerned that at Heathrow airport NO₂ pollution remains illegally high. The airport’s most recent air quality strategy⁶ indicates, in figure 4, that annual average NO₂ concentrations remain significantly over the EU limit at a number of sites, with reductions having taken place “not as fast as predicted”. When a third runway was being proposed at Heathrow, AEF produced analysis expressing our own concerns about whether the air quality improvements on which approval of the development depended could realistically be anticipated.

We note with dismay that Defra has announced as part of its response to the Red Tape Challenge that:

Working in partnership with other Member States, we will... use the European Commission review of air quality legislation, expected in 2013, to seek [a]mendments to the Air Quality Directive which reduce the infraction risk faced by most Member States, especially in relation to nitrogen dioxide provisions.⁷

We consider that a campaign, as is implied in this document, to protect the UK from fines or similar measures arising from its breaches of pollution laws enacted for the protection of public health, would be a disgraceful approach to the problem of the UK’s failure to achieve legal limits. In relation to airports specifically, additional action is clearly required in the Heathrow area to protect local communities from illegal levels of NO₂.

Public safety

In our response to the scoping document consultation, AEF submitted a paper titled *Airports, risk and the public interest*⁸, which set out in some detail our concerns about the way in which the public around airports is protected from the risk of crashes, and the impact that the current policy has on planning applications and decisions. We called in that paper:

“for DfT to advocate the rigorous implementation of current policy, including its guidance on transport infrastructure, and either to amend or supplement it with guidance on how both risk in areas adjacent to a PSZ, risk at airports without PSZs, risk arising from high density developments, and risk arising from changes in airport operations should be dealt with by LPAs.

⁵ Barrett S et al, October 2012, *Air quality impacts of UK airport capacity expansion*

<http://lae.mit.edu/wordpress2/wp-content/uploads/2012/10/LAE-2012-010-R-v1.pdf>

⁶ http://www.heathrowairport.com/static/Heathrow/Downloads/PDF/air-quality-strategy_LHR.pdf

⁷ Industrial pollution liaison committee 4 July 2012, Industry forum 11th July 2012

<http://www.defra.gov.uk/industrial-emissions/files/IPLC+-IF-red-tape-challenge-paper-July-2012.pdf>

⁸ http://www.aef.org.uk/uploads/Airports_risk_and_the_public_interest_.pdf

We continue to feel that DfT policy on third party risk needs review, and very much hope that the final framework will commit to this.

Do you think that noise regulation should be integrated into a broader regulatory framework which tackles the local environmental impacts from airports?

Environmental impacts such as air pollution, water and waste management, are controlled through a system of enforceable limits. We would strongly support a similar approach being developed for noise regulation.

Chapter 5: Working together

Do you think Airport Consultative Committees should play a stronger role and if so, how could this be achieved?

Many of our members feel that airport consultative committees are at best a fig leaf, with the airport having no real intention to take on board any but the most inconsequential feedback received through the committee, and at worst a means of actively discouraging engagement with the airport; we have heard some ACCs being described by local people as being harder to access than the Masons. We are astonished that even at some large airports such as Stansted, no mention is made of the consultative committee on the airport website, and no direct email address appears to be available for the chair. A review of the guidelines for consultative committees could help to correct some important omissions in relation to now commonly used technologies, but the attitude of secrecy and/or intransigence that many of our members report may require more thoroughgoing change.

There is, in our experience, a widespread perception among community groups that ACCs are run essentially for the benefit of the airport and we feel that there is a need to review ways of ensuring that communities are treated as equal participants in the process. The Framework as it currently stands does not appear to adopt the neutral starting point that we feel is required. Section 5.15 states, for example, "The work of ACCs should recognise the wider role of the airport as an important local employer and influential driver in the local economy" as though there were never any question about whether or not a given airport is an 'important' employer or an influential economic driver. Many communities would contest these assumptions. Nevertheless, we welcome the proposals made in the framework in relation to committee chairs, and look forward to the opportunity to consider further improvements in the context of the review of ACC guidance.

Is there a case for changing the list of airports currently designated to provide consultative facilities?

Yes. The basis for designation is unclear, and Coventry Airport remains on the list.

Do you agree that the Civil Aviation Authority should have a role in providing independent oversight of airports' noise management?

AEF welcomes moves for the CAA to more actively engage in environmental questions and we consider the Civil Aviation Authority to have considerable technical expertise in relation to noise. We believe that the role of the CAA with respect to environment should be twofold, namely to either inform or deliver Government policy. We do not believe that it would be appropriate for the CAA to be expected to make judgments on the acceptability of noise measures without clear direction from Government on the criteria against which this judgement should be based. An understanding of noise impacts requires not only the technical ability to undertake accurate measurement and to mathematically analyse the resulting figures, but also an appreciation of the complex ways in which noise affects people including the fact that people respond to noise differently, that Leq cannot on its own effectively communicate levels of noise disturbance, and the importance to many people of respite and of predictability.

We do not consider that the CAA is regarded by communities as sufficiently independent to be able to arbitrate in relation to noise measures where such issues need to be taken into account. Our response to the CAA's consultation earlier this year on its own environment programme expressed the following areas of concern in relation to the perceived 'independence' of the organisation:

- (i) As the CAA is funded entirely through its charges, it is seen by many communities as a mouthpiece for industry. At a practical level, it is of course industry stakeholders with whom the CAA most often has contact. Yet even in relation to its proposed environmental work, the 'bodies with an environmental remit' with which the CAA plans to engage include various parts of the industry, but no NGOs, local community groups, or expert environmental bodies such as the Committee on Climate Change. The consultation section on biofuels similarly refers to supporting 'the sector's strategy' (page 25); it would be better for the CAA to support debate about a strategy for aviation biofuel that takes account of the views and interests of the public.
- (ii) The CAA might need to be ready to rethink its approach to environmental challenges based its proposed engagement with local communities. On noise, for example, the consultation document, and the environment 'insight note' similarly, suggest that as the CAA's analysis indicates that noise, when measured in Leq or similar, is reducing over time, the only remaining challenge is to facilitate communication and improve relations between airports and affected communities, perhaps with some compensation. There is plenty of data from other sources, however, to suggest that both annoyance from aircraft noise and health impacts as a result of it are in fact worsening over time. Many communities believe that this is due to fundamental shortcomings in the existing metrics used for monitoring aircraft noise in the UK, which fail adequately to capture the disturbance caused by an increasing number of aircraft. Neither conversation with their local airport, nor compensation, would necessarily help to resolve this.
- (iii) The CAA would need to carefully frame the advice that it is required to give Government on whether sufficient airport capacity exists to meet demand, since demand constraint is among the measures that the Government uses to manage aviation's environmental impacts. It would be possible for the CAA to provide this advice on a purely statistical basis, without recommending any particular policy decisions on capacity, though the recent 'insight notes' seem to be taking the CAA in the opposite direction, as do statements in the consultation document about plans for the CAA to enhance its policy role.
- (iv) The primary duty on the consumer that would be created by the Civil Aviation Bill in relation to the CAA's role as economic regulator, while it may challenge the organisation to think beyond

the interests of airlines and airports, may nevertheless cement the idea that it has relatively little concern for people affected by aviation but not falling in the category either of 'industry' or 'consumer'. Page 22 of the consultation document suggests the CAA's environmental information powers relate only to consumers, but their intended audience under the Bill would, as we understand it, be wider than this. We are pleased that right at the start, the consultation document (on page 1) states: 'As set out in our Strategic Plan, our clear commitment is to protect the interests of the public'. Nevertheless the word 'consumer' is used, by our count, three times as often in the document as the word 'public'!

Do you agree with the Government's overall objective on working together?

AEF has always been committed to the ideal of securing appropriate policy solutions to environmental challenges, with a view to avoiding unnecessary conflict between local communities and airports. Nevertheless we consider that in many cases the problems lie not so much in difficulties of communication between these two groups as in simple differences of interest. The goal of 'working together' should not, therefore, be seen as a substitute for appropriate Government intervention on behalf of people affected by aviation's market externalities. The Government should not wait for consensus among different groups of stakeholders before taking action, where action is clearly required.

Notwithstanding this, as discussed elsewhere in our response, we very much welcome the acknowledgment in this section of the Framework that Leq is inadequate without complementary metrics as a means of expressing noise annoyance, and believe that guidance should be produced on how and in what circumstances airports might consider other techniques for reporting noise.

Is the high-level guidance provided in Annex E sufficient to allow airports to develop local solutions with local partners?

We are strongly opposed to the suggestion in section E.5 that:

Perhaps one of the most important issues master plans should seek to address is what the long term land requirements are for future airport development and whether this requires changes to airport boundaries. Where it does, the additional land and property involved, including those associated with PSZs and safety surfaces, should be clearly identified to minimise long term uncertainty and non-statutory blight.

Originally envisaged as the means for airports to communicate how they planned to pursue Government-approved expansion plans, in the absence of airport-specific recommendations, master plans can surely be no more than airport business plans, designed to please shareholders and thus improve an airport's value. It seems extraordinary that the Government should seek to give such documents, which require no approval by local authorities or statutory bodies, the status of semi-official planning documents on the basis of which land should be safeguarded for development.

Annex E refers to the important role of 'forecasts' in this process. Yet it is in an airport's self interest to generate excessively optimistic figures in terms of likely throughput. Verification should, as a minimum, be required by checking these forecasts against the DfT's projections.

Do you agree that master plans should incorporate airport surface access strategies?

We would agree that master plans should make reference to any agreed surface access strategies. The draft Framework notes in section 4.99, however, that unlike airport master plans, which are drawn up by airports with no requirement for collaboration with or approval from local authorities or other bodies, in developing surface access strategies, "the Government, its agencies and local authorities work with airport operators". We believe therefore that it would be difficult to synch the processes for preparation of the two documents. We would be strongly opposed, for example, to an approach whereby surface access strategies were required to make provision for transport levels as determined by an airport master plan, which may anticipate developments that are unrealistic or which may prove unacceptable when considered by the planning process.

Do you agree that, where appropriate, the periods covered by master plans and noise action plans should be aligned?

Yes, we agree that this would aid clarity.

Appendix: statements in the draft framework on fuel efficiency

Statements on fuel efficiency

The 'draft aviation policy framework' says: "*Since the 1970s, technological advances have reduced fuel burn, and therefore CO2 emissions, by 70 per cent per passenger kilometre. [ref 4 from the list at the end of this document is given] In the last 10 years, although air traffic has increased by 45 per cent, the demand for jet fuel has increased by only three per cent. [ref 3 is given]*

Evidence on fuel efficiency since the 1970s

The only 'evidence' that is given on the subject is a couple of statements taken from an Airbus book and an IATA 'factsheet'. These are far from independent sources, with a vested interest in emphasising improvement in fuel efficiency while downplaying increases in aircraft emissions that have resulted from traffic growth.

There is, however, a considerable body of independent, published research on the subject of fuel efficiency, some of which was discussed in the Government's aviation forecasts of August 2011. No mention is made in the consultation document of this research or its conclusions.

AEF is very concerned about the fact that the consultation chooses to quote only results from industry publicity material, not from independent academic research, which paints quite a different picture. In particular it suggests either that as much as half of the fuel efficiency improvement per passenger since the 1970s has arisen from increases in seat occupancy rather than from any technological improvements or that the industry figure is simply inaccurate.

Examination of research papers does not support a figure of 70% improvement arising from 'technological advances'. All the research suggests a lower, usually very much lower, rate of improvement in fuel use per available seat kilometre.

Future fuel efficiency improvements likely to be much lower

Whatever the veracity of the 70% figure, its relevance is in any case highly questionable. Recent analyses by both the Department for Transport and the Committee on Climate Change have predicted very low rates of aircraft efficiency improvement over come years. The latest DfT forecasts actually predict a *worsening* of aircraft efficiency over the next decade, with an average annual efficiency improvement of just 0.4% forecast for 2010-2030 under the central forecast.

The text notes that these figures are significantly lower than in older forecasts which assumed "that soon after 2000 new aircraft models beyond the mid-1990s types ... would be entering the fleet. With the exception of a limited number of A380s there has been no introduction of significant new types in the past decade. These earlier forecasts would, for example, have been based on the assumption that Boeing 787s (and possibly A350s) would have, by now, replaced many less efficient

medium and long haul types. Entry into service may have lagged almost 10 years behind the expectations in the early 1990s.”

This tells a very different story from the one presented in the framework. Specifically, it suggests that:

- (iii) The IATA target of 1.5% (referred to in section 3.10) is unlikely to be achieved without additional measures
- (iv) Efficiency gains achieved in the past (referred to in section 3.31) have increasingly little relevance to the future.

IATA ‘factsheet’

An IATA factsheet dated Dec 2011 (ref 4) says:

- *Air transport has reduced its fuel use and CO2 emissions per passenger kilometer by 70% compared to 1970s*
- *Total emissions for 2010 increased by 3.5% to 649 million tonnes CO2 (compared with 627million tonnes in 2009)*
- *Emissions growth of 3.5% in 2010 is the result of:*
 - *Increase of 5.2% due to capacity increase (33 million tonnes)*
 - *Reduction of 1.7% from efficiencies (11 million tonnes)*

There is no evidence provided to support the claim of a 70% emissions reduction and there are no links or references.

Airbus book – global market forecast

This book (ref 3) is undated but it is fair to assume that it was published in 2011 as a presentation was given about it in September 2011. Both the 70% and 3% figures are asserted:

Page 1 (intro). .. *“but also environmentally, with each aircraft for example 70% more fuel efficient than just forty years ago.”*

Page 5. *“In the last 40 years, manufacturers have reduced the fuel burn of aircraft and therefore CO2 emissions by 70%, noise by 75%, with work continuing to deliver further improvements. .. In the last ten years the demand for jet fuel has increased 3%, whilst traffic in terms of rPKs (revenue Passenger Kilometres) has increased 45%.”*

Page 62. *“Much has been achieved in the aviation industry, over the last 40 years; for example fuel burn and therefore CO2 has been reduced by 70% ..”*

Page 64. *“If we look over the last 10 years it can be seen that due to the improved productivity coming from airline operations and the take-up of new eco-efficient types, the demand for aviation fuel, has been relatively flat over this period, increasing ~3% over the last ten years. Aviation’s productivity in terms of the traffic performed has increased more than 45% over this period ..”*

No evidence or references are given to support the 70% figure.

The Airbus paper provides a useful analysis of load factors (the average proportion of seats filled), showing that load factors have increased from around 55% in 1967 to 77% in 2010 (page 65 of ref 3).

Is the claim of a 70% reduction in 40 years backed up by the research papers?

Since the draft framework refers to the period “*since the 1970s*” and the IATA factsheet was written in 2011 and refers to “*the last 40 years*”, we assume that the 70% figure in the consultation, the IATA factsheet and the Airbus report refer to the years 1970 to 2010, or approximately so.

Peeters 2005 (ref 1) provided evidence of the ‘energy efficiency’ of various aircraft which is defined as the energy consumption per available seat kilometre. Points are plotted on a graph indicating the efficiency of new jet aircraft types against the year that they were first delivered and a power curve regression line is fitted. The graph was updated in 2010 (ref 2) showing points from around 1970 up to about 2012. (It is possible to show dates after the publication date because the energy efficiency of a plane is known some time before it is delivered.) The data was published by Lee et al in 2001, updated for post-2000 jets by Peeters. The expression ‘energy intensity’ (EI) is used, but this is still defined as the energy consumption per available seat kilometre. The regression is extended up to 2020.

Reading data from Peeters’ graph (fig5, p80 of ref 2) values for EI of 1.79 in 1970 and 1.02 in 2010 are obtained. The reduction between 1970 and 2010 from Peeters’s graph is 43% ($100 \times (1 - (1.02/1.79))$). This is a huge difference from the 70% quoted by Airbus and the consultation.

While a power curve may be a better method of fitting Peeters’s data, it is conventional to use annual percentage increases when discussing efficiency. This implies an exponential rather than an (optimum) power curve. For comparison purpose, we therefore express the Peeters’ results in terms of annual percentage increases in efficiency. (It should be noted that because the power curve has more variables than an exponential curve, it can represent a curve with a varying annual growth factor. This is not too important if one is comparing datasets with the same time period, but may be very significant when comparing different periods.)

Peeters’s reduction of 43% from 1970 to 2010 is equivalent to an annual factor of 0.986 ie EI in a given year is 0.986 of that the previous year. This is equivalent to an increase in fuel efficiency of 1.4% pa. $[(1/0.986) \times 100 - 100]$

The 70% reduction from Airbus and the consultation implies an annual improvement of 3.1%. That is, over double the rate of Peeters.

A similar analysis of fuel efficiency trends has been carried out for the International Council on Clean Transportation (ICCT). See ref 6.

The abstract gives a diagram showing efficiencies of new aircraft from 1960 to 2008 in terms of fuel burn per available seat-km (passengers only) and per ton-km (passengers and freight). The graph shows a reduction in fuel use of 50% over the 48 years. This obviously represents a far lower rate than 70% over 40 years, even though the ICCT report includes a period of the very fastest improvement - 1960 to 1970 - a period excluded from the timescale of the 70% claim.

The report gives annual improvements in efficiency in terms of available seat-km:

1970s 0.6% pa

1980s	3.55 pa
1990s	0.7% pa
post 2000	0.0% pa

For the whole period 1970 to 2008, this is equivalent to a (constant) 1.2% pa improvement. This way below the 3.1% implied by the 70% reduction claim.

The DfT 2011 demand and CO2 forecasts provide an analysis of historical fuel efficiency (para 3.31-37 and box 3.3 of ref 5). Because fuel efficiency improvements seem to be slowing, figures are not quoted for long periods such as 1970-2010:

1960 – 1980: IPCC 2.6%, Peeters 2.2%

1980 – 2000: IPCC 1.2%, Peeters 0.9%

1971 – 1985 Lee et al 2.7%

1985 -1998 Lee 1.2%

1997 – 2006 IATA 2.4%

It can be clearly seen that all the figures are well under the 3.1% implied by the 70% reduction claim.

There is a complexity in that the IPCC and Peeters data are based on new production aircraft. The fuel efficiencies thus reflect the efficiency of new aircraft but not the mix of old and new aircraft in the fleets. In the long run (well over the average life of aircraft) these efficiency improvements will be the same, but over shorter periods the rates could be appreciably different. Lee's and IATA's results may be based on fleets but this is not made clear in the CO2 forecasts document. Lee's results are based on US data only.

It is possible that a 70% reduction in emissions has occurred but that it relates not to available seat km but to revenue seat km – in other words that increases in aircraft load factors have played a significant part. Peeters shows a load factor at a low at 1970 of about 48% rising to about 76% in 2004. Fuel efficiency improvements would for most of the period appear much higher if load factors were built in though not for the period 1997-2006.

1971 – 1985: Lee excl load factor 2.7%, incl load factor 4.6%

1985 – 1998: Lee excl load factor 1.2%, incl load factor 2.2%

1997 – 2006: IATA excl load factor 2.4%, incl load factor 2.3%

The draft policy framework says, however, in respect of the 70% reduction: *“Since the 1970s, technological advances have reduced fuel burn, and therefore CO2 emissions, by 70 per cent per passenger kilometre.”* So this figure clearly should *not* include load factors. The reference to ‘technological advances’ suggests, however, that no account has been taken of aircraft load factors in the 70% claim.

Is the claim of a 45% increase in traffic with 3% increase in fuel backed up by the research papers?

The draft aviation policy says: *“In the last 10 years, although air traffic has increased by 45 per cent, the demand for jet fuel has increased by only three per cent.”* This references the Airbus book.

The Airbus book states: *“In the last ten years the demand for jet fuel has increased 3%, whilst traffic in terms of rPKs (revenue Passenger Kilometres) has increased 45%.”*

This implies an improvement in fuel efficiency of 42%, equivalent to an annual value of 4.1% pa. Based on fuel consumed, the improvement will include the effect of load factors. It will also reflect fleet mixes as well as the efficiencies of new production aircraft.

The Airbus claim, if it is correct, must be due to a big increase in load factors. There is no suggestion anywhere of fleet changes to account for such an increase.

The IATA factsheet says: *“Total emissions for 2010 increased by 3.5% to 649 million tonnes CO2 (compared with 627million tonnes in 2009)*

- *Emissions growth of 3.5% in 2010 is the result of:*
 - *Increase of 5.2% due to capacity increase (33 million tonnes)*
 - *Reduction of 1.7% from efficiencies (11 million tonnes)”*

The IATA figures do not directly contradict the Airbus figures because the timescales are different, but they do not give them any support. Noting that emissions are directly proportional to fuel, IATA’s increase in efficiency of 1.7% in 2010 is far lower than Airbus’s average 4.1% and it is much closer to a typical or expected yearly figure. The IATA figure will include load factors, so that cannot explain difference between IATA and Airbus.

It is clear that while there might have been a big increase in fuel efficiency over the last 10 years, this can only be because of increasing load factors. It cannot be due to technological advances. Putting this statement in the draft framework is misleading without this explanation.

Conclusions

The draft framework’ says: *“Since the 1970s, technological advances have reduced fuel burn, and therefore CO2 emissions, by 70 per cent per passenger kilometre”*. This is taken directly from an Airbus book. This is equivalent to an average annual improvement of 3.1% pa. There is no evidence provided to support the claim of 70% reduction and there are no links or references. The figure is also quoted in an IATA ‘factsheet’ but, again, there is no evidence given.

Examination of research papers does not support this 70% figure for fuel efficiency improvements as a result of technology improvements. All the research suggests a lower, usually very much lower, rate of improvement in fuel efficiency.

Detailed evidence on fuel efficiency trends was given in the UK aviation forecasts, published by the Department for Transport in August 2011. This references some of the material quoted here and other research. None of the research supports the 70% figure. This analysis is not mentioned, however, in the draft framework.

Whatever the veracity of the 70% figure, its relevance is in any case highly questionable. All researchers agree that rates of fuel efficiency improvement have fallen considerably over the last few decades. Commentators give figures of the order of only 1% per annum or less for future years. This contrasts dramatically with the (average) growth rate of 3.1% which corresponds to a 70% reduction in 4 decades.

The draft framework also says: *“In the last 10 years, although air traffic has increased by 45 per cent, the demand for jet fuel has increased by only three per cent.* This too is taken from the Airbus book.

If taken at face value, this would represent an extraordinarily big improvement in efficiency of 4.1% per annum. There is no evidence elsewhere for such a figure. The IATA factsheet paints a quite different picture, suggesting an efficiency improvement of 1.7% based on comparison of 2009 and 2010 data.

The Airbus figure may be as high as it is because it allows for increasing load factors over 10 years. But increasing load factor is not a technological advance, so it is misleading for the draft framework to quote the statistic in a paragraph relating to technological advances.

The draft framework, written by DfT, has ignored the carefully analysed and referenced conclusions on fuel efficiency in its own 2011 forecasts. Instead, it has cherry-picked misleading sound bites from industry propaganda to give the impression that fuel efficiency improvements are far greater re happening far more quickly than they really are.

References

1. ‘Fuel efficiency of commercial aircraft: An overview of historical and future trends’, Peeters P.M, Middel J, Hoolhorst A, Nov 2005
2. ‘Tourism and the Implications of Climate Change: Issues and Actions, Bridging Tourism Theory and Practice’, Volume 3, 67–902010, Emerald Group Publishing Limited, Chapter 4: ‘Tourism transport, technology and carbon dioxide emissions’, Paul Peeters.
3. ‘Delivering the future – global market forecast 2011-2030, Airbus.
(<http://www.airbus.com/company/market/forecast/passenger-aircraft-market-forecast/>)
4. IATA ‘Factsheet’,
http://www.iata.org/pressroom/facts_figures/fact_sheets/pages/environment.aspx
5. ‘UK aviation forecasts’, Department for Transport, Aug 2011
6. ‘Efficiency trends for new commercial jet aircraft 1960 to 2008’, International council on clean transport, Daniel Rutherford and Mazyar Zeinelli, 2009.