General Aviation Alliance

Consultation Response to the Department for Transport on:

Developing a sustainable framework for UK aviation: Scoping document

Introduction

The GA Alliance is a broadly-based grouping of General Aviation (GA) and Sports and Recreational Aviation (S&RA) organisations, with a total of 72,000 members in the UK, involved in a variety of aviation activities and sports. We aim to co-operate and consult with government and other organisations as stakeholders to support and progress GA interests.

The views expressed here represent the agreed core views of GA Alliance members. The individual organisation may also provide their own responses to this consultation, to highlight areas specific to their particular interests.

This consultation is wide-ranging and incorporates several areas on which we do not claim special expertise or wish for close engagement. Therefore, we will not always provide detailed responses to the questions below, some of which cover issues of interest mainly to Commercial air Transport (CAT) and/or the consumer, our response will focus on the GA sector, in particular on the issues related to Sports and Recreational Aviation (S&RA). We will also refer to the larger context of commercial GA and Business Aviation because of the important linkages between these sectors and the interests of our member organisations.

The Aviation Sector

5.1. How does the aviation sector as a whole benefit the UK? Please consider the whole range of aviation activities including, for example, air freight, General Aviation and aerospace.

The Economic Importance of GA. The arguments for commercial aviation's importance to economic growth are frequently rehearsed by the industry and are summarised in the consultation document. We do not disagree with these benefits and in general our members are 'air-minded' and supportive of aviation. This response is focused on GA and S&RA. Using CAA 2006 figures, GA represented about £1.4bn, or 14% of the UK aviation sector in terms of economic activity. This is the conservative value placed on GA in the consultation document. However, a more recent study by PriceWaterhouseCoopers[1] on the total value of Business and General Aviation found that the contribution to the UK economy was £3.7bn, equivalent to 0.2% of UK economic activity, with 50,000 people directly employed.

GA includes the great majority of UK-registered civil aircraft. CAA statistics for January 2011 indicated that 20,379 civil aircraft were registered in the UK, of which 13,811 were currently active, more than 12,000 being GA. S&RA is a major element of GA – there were 4,499 active powered aircraft with a national Permit to Fly, most which are

[1] PriceWaterhouseCoopers, The Value of Business Aviation, March 2009

regulated by the CAA through GA Alliance member organisations. Lober[2] estimated in 2008 that 4.6 million GA movements took place annually between approximately 1,140 flying sites. This figure is more than twice that for the combined numbers of airline sectors and cargo flights, involving UK airports.

Flight training is a significant GA commercial activity in the UK which supports CAT as well as private flying, but has been impacted by various adverse policies. The 2006 CAA Strategic Review of General Aviation identified that UK flying schools were at a competitive disadvantage in comparison with those based in other countries. This was due to a number of factors, primarily the financial impact of higher UK regulatory charges and taxation (such as VAT on fuel and training). Statistics are difficult in this area, but in 2004/5 about one third of professional pilot licences were issued to non-UK applicants – an increase of 25% over the preceding 10 years. Currently a self-sponsored student will probably have to pay £80,000 in fees from personal taxed income for professional pilot training in UK. The result will be fewer British airline pilots.

From these facts and statistics, it should be abundantly clear that UK aviation must not be driven by a policy framework constructed entirely around CAT, the airline passenger and the environment. Government should take a holistic view encompassing also GA, which provides an essential part of the national aviation picture.

5.2. What do you consider to be the aviation sector's most important contributions to economic growth and social well-being?

The 2009 European Parliament resolution 2008/2134(INI) 'An Agenda for a Sustainable future in General and Business Aviation' is a well-considered document with recommendations endorsed by the European Parliament and based on discussion and agreement with the European GA community. The considerable arguments for the importance of GA to economic growth are well rehearsed in this document, for which the Aviation Minister has expressed support. We believe the DfT should place the recommendations expressed in this resolution at the heart of its policy on GA in the UK.

We also contend, in 5.4 and 5.7 below, that the UK in particular has for decades been crippled in terms of its light aviation manufacturing industry, by an overly bureaucratic approach to regulation. If we seek economic growth from the aviation sector, this is a vital area for development.

In terms of social well-being GA and especially S&RA provides a valuable contribution to society and individuals, by providing a range of recreational opportunities for many tens of thousands of people, from all walks of life, to experience light aviation and the many air-sports. For those more adventurous spirits who need more than a computer screen or a country walk, S&RA provides structured opportunities for personal development and engagement with genuine challenges. It also provides motivation for many people to make a career in military or civil aviation, which is certainly in the national interest.

5.3. Are some sub-sectors of aviation more important than others? If so, which and why?

Clearly, some sectors represent a larger amount of economic activity, but this is not the only issue. CAT is the largest sector, but much CAT economic activity does not result in significant benefits to the UK economy. As an example, consider transit passengers

[2] Lober, T., 2008, 'The effectiveness of national strategic guidelines at a local level: a case study of the UK general aviation industry.' PhD Thesis, Bartlett School of Planning, University College London, London University

though hub airports, especially those travelling with airlines which do not pay UK Corporation Tax, and who do not pay Air Passenger Duty if they do not change aircraft. In general, the international nature of the CAT industry makes it difficult for national governments to develop taxation income streams appropriate to the environmental and resource impacts of CAT. This industry demands the use of resources such as airspace which have substantial opportunity costs to the nation, while making a substantial environmental impact for which it currently does not pay. By contrast, GA is primarily UK based, pays tax and duty on fuel used, VAT and corporation taxes.

5.4. How do you think the global aviation sector will evolve in the medium and long term (twenty to fifty years)? What do you expect to be the most significant changes?

There will be a continually-increasing focus on sustainability, driven by environmental concerns and the increased price of fossil fuels. In GA, this will drive technological advances in aircraft and engine design which will be notably different from those in CAT and military aviation. These will include electrically-powered light aircraft, solar power, extremely economical fossil-fuel engines, new aviation biofuels, increased use of auxiliary-powered gliders for point-to-point transportation and advanced aerodynamics. Such technological advances will allow GA (and S&RA in particular) to continue through a future 'end of oil' scenario. The popularity of unpowered flight (gliders, hang-gliders, etc.) will increase. These developments will also greatly reduce S&RA environmental impacts in the medium term.

The GA sector generally will be forced to develop and fit avionics and navigation systems for interoperability with CAT and ATM in the 'trajectory-based' future airspace scenario envisaged by Future Airspace Strategy (FAS). GA will also increasingly be required to share airspace with unmanned aircraft, which will further impact on the need for advanced avionics and digital communications.

These forthcoming developments represent potential opportunities for UK businesses. In recent years the UK has rarely been competitive in manufacturing for GA and the burgeoning S&RA market, primarily due to over-regulation by the CAA. Much of the S&RA sector is nationally regulated (Annex II aircraft, representing a large minority of UK GA aircraft, are not subject to EASA control) and hence the opportunity exists for government and the regulator to develop partnerships with business and the S&RA organisations, to promote a sector of UK industry which has been hidebound by unnecessary red tape.

5.5. How, and within what constraints, can aviation growth occur as technological developments and improved operating procedures reduce CO_2, pollutant emissions and noise impacts?

The answer to question 5.4 above indicates some of the likely technological changes in S&RA. These will radically reduce the overall environmental impacts of light GA aircraft in the medium term. To the extent that disposable incomes allow, there will be a continuing demand for S&RA, founded on the long traditions of UK aviation, the mature infrastructure and the established voluntary associations which support the sector. We believe that growth in this sector may therefore be promoted in the interests of general economic health without adverse impacts on the environment. See the answer to question 5.30 for consideration of emissions.

The noise impacts of GA and S&RA are very variable. GA training flights use an established technique which involves repeatedly conducting circuits of the airfield and landing. This may occasionally irritate local residents, but remains an essential

component of pilot training. However, very few GA aircraft are comparable in noise output with CAT aircraft, while S&RA aircraft are usually much quieter than traditional GA aircraft. Gliders are silent, while all UK microlights are now subjected to stringent statutory noise tests. Noise impacts which initiate complaints from the public tend to be limited to areas within a 2 mile radius of GA airfields. Nearly all S&RA flights take place during the daytime, in fine weather. Relatively little flying takes place in the winter months.

5.6. How should decision-makers address trade-offs or competing interests, where these occur both (a) between different aviation objectives, e.g. CO_2 emissions versus local noise reduction, and (b) between aviation and other sectors, e.g. airspace use versus renewable energy objectives, or the use of land for maintaining a viable network of smaller airfields versus housing development?

a) Decision-makers should employ decision-making techniques! There is no shortage of well-established methods to balance competing interests and take trade-offs into account. The key issues revolve around *the establishment of informed decision-making processes which are transparent and take account of all relevant stakeholders' interests*. GA and S&RA are often under pressure from CAT commercial interests; frequently on specious or overstated safety grounds. Considering the allocation of airspace, a recent Transport Committee recommendation was that "The CAA and NATS should review the techniques used for designing controlled airspace around airports. The techniques used should match European and USA best practice to minimise the impact on general aviation, whilst ensuring safety and that current standards are not lowered".

b) We must ensure safeguarding of GA airfields, which provide an alternative transportation network to our congested roads and major airports. There is always pressure on these sites from developers, as they have been classified as 'Brownfield' sites and therefore it is relatively easy to obtain planning permission to develop for housing. Under the recent proposals to remove most planning restrictions, local planning authorities will be left with a very limited framework within which to work, and a presumption of allowing development wherever there is no overriding reason to object. The UK national interest requires an infrastructure to support GA - planning policies and guidance must be aligned with this need. The UK network of smaller airfields and flying sites is fundamental to aviation and a matter of significant concern identified in the 2006 CAA Strategic Review of GA. In the review report the CAA's recommendation was for '*…a Policy Statement on the value of maintaining a viable network of GA airfields to be considered by those involved in planning decisions….*' GA and S&RA related issues cannot be properly assessed at a local level, as flying sites form part of a larger national network.

The primary issue in terms of renewable energy objectives is the current proliferation of wind turbines erected for private profit, driven by government subsidies. Planning authorities now have very limited grounds available for rejecting applications. The great size of many recent wind turbines increases their impact on light aviation, which involves an increasing accident risk from collision and turbulence (about which little is known). There is no planning protection for most flying sites, against the erection of wind turbines in the immediate vicinity, while rural ridge lines are increasing the site of wind farms which endanger gliders and other light aircraft operating at low level. The economic justification for onshore wind energy generation is becoming increasingly suspect, while wider environmental objections are the subject of much public debate. The view of the GA Alliance is that, on safety grounds: 1) established flying sites should

have planning protection and 2) onshore wind turbines should be limited in size to 60m overall height.

5.7. Should some aspects of UK aviation be considered to be of strategic national interest (e.g. certain airports, air traffic control)? If so, based on what criteria?

Most thoughtful people will agree that the UK needs a number of international and regional airports, served by CAT, and hence also an air traffic control infrastructure. The primary need is economic – engagement with globalised world business is essential to the strategic national interest, and for the foreseeable future CAT will be necessary to facilitate trade and the essential movement of business people. The advantages deriving from holiday travel are less obvious: although tourism into the UK brings significant economic benefits (spending by overseas visitors was estimated at £16b in 2010), it is arguable whether the development of CAT into the low-cost mass market brings overall economic benefit to the nation, while requiring a substantial additional aviation infrastructure (e.g. Stansted).

Considering in particular the position of GA and S&RA, there are two strategic national interests and a further potential national interest to consider.

Firstly, there are the essential services provided by GA, including Police and air-ambulance flights, search and rescue, Coastguard, etc. Aerial survey, agricultural application, pipeline/powerline patrols, executive and VIP transportation are also important services. For some of the more remote areas of the UK, modern civilization would not be possible without the benefits provided by GA operations. All these services depend on our GA infrastructure of airfields, heliports and maintenance facilities, together with their many supporting businesses. To remain economically viable, this national GA infrastructure also depends on the private flyer and the S&RA sector.

Secondly, there is infrastructure support for CAT. This has two main elements, flight training and the overlapping infrastructure at regional airports. Nearly all airline pilots began their journey to professional competence in the cockpit of a GA aircraft, usually flying from a GA airfield. Without flight training, UK CAT would be dependent on pilots trained overseas. Regional airports are an essential element of the UK's transportation system, but for many of the smaller ones (e.g. Exeter, Humberside) the CAT business is too small to support the required infrastructure. GA makes up the shortfall, with many based aircraft, commercial operations, maintenance businesses, etc.

Finally, to consider the potential national interest, we should look around Europe at the many successful start-up GA and S&RA aircraft manufacturers which have developed recently in countries such as Austria (Diamond), Italy (Tecnam) and the Czech Republic (CZAW), to name but three. The UK, despite its engineering talent base and aviation traditions, has not developed such successful wealth-creation businesses in aviation, mainly because of inappropriate regulation over many decades. To achieve success, aviation manufacturing businesses must often start small – in terms not only of business size but of aircraft size. Manufacturing success is a key strategic priority of the government and DfT policy must be aligned. In particular, policy to open up business opportunities in the nationally-regulated Permit to Fly sector should be developed, with the CAA, to re-develop a UK light aviation industry.

5.8. How might the cost of regulation to the aviation sector be reduced, while achieving the Government's objectives of promoting sustainable aviation, improving the passenger experience at airports, and maintaining high standards of safety and security for passengers and freight?

As regards S&RA, the CAA should delegate powers for supervision of Annex II aircraft to the mature and responsible UK voluntary associations, such as the Light Aircraft Association and British Microlight Aircraft association, which already carry out much of the work of supervising initial and continuing airworthiness for aircraft on UK national Permits to Fly. The CAA should also extend use of partnerships with the existing comprehensive infrastructure of established industry bodies such as BBAC and BGA, in place for many decades, to reduce the cost of regulation of the relevant GA sectors including C of A aircraft.

International connectivity and hub airports

5.9. How important are air transport connections – both international and domestic – to the UK at both national and regional levels?

Air transport involves much more than just CAT. Scheduled and charter connections for both passenger and freight transportation are only the most visible aspect. GA and Business Aviation provide an alternative network of connections, using an overlapping set of airfields and facilities. A very large number of point-to-point VIP, business and recreational flights are made using GA, both international and domestic. Some business people choose to fly themselves; many more use company-owned or chartered light jets, helicopters and piston-engined GA aircraft. The airfields used by Business Aviation are often shared with GA and would not be viable without the broader user base. Indeed, there are numerous UK regional airports which have limited CAT, but would also be unviable without GA and Business Aviation. This interdependence of the broader aviation network with CAT is an essential issue to consider, in developing policy to promote transportation resilience in the UK.

5.10. As long as people and goods can easily reach their desired destination from the UK, does it matter if they use a foreign rather than a UK hub airport?

No comment.

5.11. Are direct connections from the UK to some international destinations more important than others? If so, which and why?

No comment

5.12. How will the UK's connectivity needs change in the light of global developments in the medium and long term (twenty to fifty years)?

The GA Alliance believes that this is unknowable, and that answers to this question will always tend to reflect the respondent's hopes rather than their predictive capability. Where attempts to address long-term aviation development have been made by UK governments, policy has usually been subverted by unexpected medium-term trends (e.g. aviation industry strategy, Concorde, airports in the South East). We consider that a resilient and diverse national aviation capability should be maintained, such that short-to-medium term policy may be adapted as necessary to respond to trends and initiatives. The basic principles for enhancing systems resilience include diversity, flexibility and decentralisation. A wise transportation policy would promote diverse national air transport connectivity and aviation capability, in terms of airspace design, industrial capability, airports, ATM facilities and aviation assets. Any tendency towards seeking apparent strength through standardisation, centralisation and control should be avoided, as these factors are the enemies of resilience.

5.13. What are the benefits of maintaining a hub airport in the UK?

No comment

5.14. How important are transfer and transit passengers to the UK economy?

No comment

5.15. What are the relative merits of a hub versus a point-to-point airport?

No comment

5.16. Would it be possible to establish a new 'virtual' hub airport in the UK with better connectivity between existing London and / or major regional airports? Could another UK airport take on a limited hub role? What would be the benefits and other impacts?

No comment

Regional connectivity and regional airports

5.17. Can regional airports absorb some of the demand pressures from constrained airports in the south-east? What conditions would facilitate this?

No comment

5.18. What more can be done – and by whom – to encourage a switch from domestic air travel to rail?

No comment

5.19. How could the benefits from any future high speed rail network be maximised for aviation?

No comment

5.20. How can regional airports and the aviation sector as a whole support the rebalancing of the economy across the UK?

No comment

Making better use of existing capacity

5.21. To what extent do UK airports meet the needs of their customers? How might those needs be more effectively met within existing capacity? What is the right balance between competition and regulation?

No comment

5.22. Can we extract more capacity out of the UK's existing airport infrastructure? Can we do this in a way which is environmentally acceptable? To what extent might demand management measures help achieve this?

No comment

5.23. How can we support Heathrow's hub status within the constraints of its existing capacity? Can we do this in a way which is environmentally acceptable?

No comment

5.24. How important is increased resilience at the UK's major airports to reduce delays? How best could resilience be improved with existing capacity, e.g. how might trade-offs between existing capacity and resilience play a role in this?

No comment

5.25. Could resilience become an issue at regional airports? If so, how might this be avoided?

No comment

5.26. Could existing airport capacity be more efficiently used by changing the slot allocation process, for example, if the European Commission were to alter grandfather rights? If so, what process of slot allocation should replace it?

No comment

5.27. What provision, if any, should be made for regional access into congested airports?

No comment

5.28. What provision, if any, should be made for General and Business Aviation access into congested airports?

Light GA and S&RA rarely wish to access the larger congested airports. In terms of access there are two issues: 1) such airports are surrounded by controlled airspace (CAS) which has the effect of excluding most light GA users, and 2) punitive pricing and access policies have also been adopted to discourage or exclude GA (and in some cases Business Aviation) for local commercial reasons.

Our main concern is to oppose the spread of similar access restrictions to regional airports. The large areas of unnecessary CAS recently allocated around little-used minor airports (e.g. Doncaster) illustrate the adverse impact on other airspace users. Many GA airspace users, together with the military, are squeezed into ever-smaller areas with 'corridors' and 'pinch points' where the risk of midair collision is inevitably increased. DfT strategy should oppose the undue exclusion and deterrence of GA and S&RA traffic from regional airports, whether by airspace design, punitive pricing or other policy contrivance.

5.29. What is the role of airspace design and air traffic management in making better use of existing capacity?

For GA and S&RA, airspace design in recent decades has meant only the gradual (but substantial) expansion of CAS via a long sequence of Airspace Change Proposals

(ACPs). The ACP process is complex and bureaucratic, involving consultations managed by the CAA's Director, Airspace Policy (DAP). ACPs are often connected with CAT business requirements (such as the desire to expand an airport's scheduled flight operations). They are typically justified on the grounds of safety, to provide a known, controlled airspace environment for airliners to operate. Much of the UK's CAS is Class A, with the specific intent of excluding the vast majority of GA flights. However, CAT flights can and do operate outside CAS to smaller regional airports. It is rare for CAS to be released back to 'open' Class G, the ACP process is effectively a one-way ratchet. It is rare for CAS to be released back to 'open' Class G, the ACP process has effectively been a one-way ratchet".

UK airspace has evolved, driven primarily by growth in CAT traffic, from the post-war era where airliners had very limited climb performance and used lower altitudes for cruising flight. Hence the base of CAS in many areas, notably around London, is unnecessarily low (typically 2500 ft) forcing GA to fly underneath. Other areas of airspace have been allocated to regional airports, linked by low-level airways, resulting in a complex un-designed patchwork of different classes of CAS, thorough which GA and S&RA must filter as best it can. Infringements of CAS by GA are a significant problem for Air Traffic Management (ATM). Another result of this un-designed evolution based on the post-war legacy system are airways laid out for the old beacon-based navigation technologies, giving sub-optimal routings for many CAT flights.

Change is now coming in the UK and Europe, however, with a new concept of more direct 'trajectory-based' operations for CAT. CAT and ATM will make use of new concepts and technologies currently under development under the Future Airspace Strategy (FAS), and in Europe as SESAR. This approach is also sold as having benefits to sustainability and the environment, but these are currently less clearly-defined than the commercial benefits to carriers, which specifically aim to make better use of existing airspace and airport capacity.

There are potential adverse impacts on GA and S&RA, much depending on the details of the future airspace design and approval process, which is currently under development for the FAS. There should also be opportunities to release existing CAS back to Class G. It was suggested in the FAS consultation document that a trajectory-based approach, with redesigned SIDs and STARs, might make this possible. GA Alliance members will wait hopefully for this prospect to materialise, and make proposals as appropriate.

One already known adverse impact for GA is the known requirement to fit expensive additional avionics (currently Mode S transponders and 8.33 khz spacing VHF Comm, probably later ADS-B) to enable continued use of airspace which is currently open to them.

Climate change impacts

5.30. What do you consider to be the most significant impacts of aviation, including its non-CO_2 emissions, on climate change? How can these impacts best be addressed?

The climate change impacts of high-altitude jet traffic are widely discussed. This response will focus on GA and particularly S&RA impacts on climate change. Much S&RA traffic has a very low impact on climate change. Gliders are a major element of S&RA with a particularly low impact. Powered S&RA aircraft typically use much less fuel than traditional larger GA Aircraft. The volume of CO_2 emissions from internal combustion petrol engines used by all of GA is negligible (<0.1%) in comparison with those from UK motor vehicles, as is the effect of non-CO_2 gaseous emissions (e.g. NO_x, H_2O,

particulates) on climate change. Contrails are hardly ever produced by GA aircraft. The emissions produced by the vast majority of GA aircraft are at a much lower altitude, far below the tropopause, and could not exhibit the suggested high-altitude 'climatic forcing' impact.

5.31. What role should aviation play relative to other sectors of the economy in reducing greenhouse gas emissions in the medium and long term?

No comment

5.32. How effective do you believe the EU ETS will be in addressing the climate impacts of aviation? Should the UK consider unilateral measures in addition to the EU ETS? If so, what?

No comment

5.33. What is the best way to define and quantify the UK's share of the CO2 emissions generated from international aviation?

No comment

5.34. What is the potential for increased use of sustainable biofuels in aviation and over what timeframe? What are the barriers to bringing this about?

Most powered GA aircraft use spark-ignition internal combustion engines which require gasoline fuels, traditionally high-octane AVGAS 100LL. Some of these GA and many S&RA aircraft are capable of using unleaded motor fuels, but some aircraft do require AVGAS 100LL, which will probably disappear from the market within the next few years. For GA, the current reliance on leaded AVGAS is a challenge that has to be overcome for long term survival of significant numbers of the existing GA fleet.

In the last 10 years there has been an increasing trend in GA towards the use of a new generation of diesel (compression-ignition) engines which use jet fuels (Jet A1), as do the small minority of GA aircraft, mostly helicopters, fitted with gas turbine engines.

In general, both gasoline and jet fuels are amenable to the addition of some proportion of sustainable biofuel. Considering gasoline fuels, the main barrier to progress in this area until recently was the CAA, which was not addressing these issues in a positive manner. On safety grounds, the CAA continues to ban gasoline fuels containing ethanol from all GA and S&RA aircraft except microlights. It is now becoming difficult to obtain motor fuel free of ethanol, hence forcing operators back onto leaded AVGAS. There are recent and comprehensive research results*, which indicate that the addition of ethanol to fuel presents a range of technical problems which may be addressed for many GA aircraft with relatively inexpensive modifications and some operating limitations. The CAA should engage in discussion with S&RA Associations, take account of the available research and support a constructive research-led environmental agenda. The diesel and gas turbine engines should be capable of using jet fuels containing a proportion of sustainable biofuels, as these become available for CAT.

*Research Ref: EASA Project EAEA.2008/6 SIoBiA- Safety Implications of Biofuels in Aviation:- http://easa.europa.eu/safety-and-research/research-projects/docs/miscellaneous/Final_Report_EASA.2008-6-light.pdf

5.35. What mechanisms could the Government use to increase the rate of uptake of sustainable biofuels in the aviation sector? In particular, how can we accelerate the successful development of second generation biofuels?

The special AVGAS fuel used by most GA aircraft is expensive to produce and already subject to high rates of duty and tax. Prices are up to 70% higher than motor fuel. Fuel cost is already a significant disincentive to GA and is driving technological advances, especially in S&RA, which will have the effect of reducing CO_2 and other gaseous emissions in the medium term. The lead content of AVGAS is another factor which militates against its long-term use worldwide.

Alternative biofuels for GA are under active development across the world, the main regulatory barriers to their use in the UK are addressed above. Considering these trends, the limited climate-change impacts of GA and the existing tax and duty burden there is no need for further action on reducing GA emissions by UK government.

5.36. Which technologies (e.g. for aircraft and air traffic management) have the most potential to help reduce aviation's CO2 emissions (noting potential trade-offs with local environmental impacts)?

Considering GA and S&RA, the key aircraft-related technology is electric propulsion. While there are many technological and operational issues similar to those for automotive applications, the engineering considerations also dictate key differences. The key issue is range and battery weight. Many prototypes are flying and development work is proceeding worldwide. We anticipate useful electric GA aircraft in the medium term.

Looking at ATM, the proposed FAS/SESAR concept of trajectory-based routing for CAT is the key development focus, with its associated technologies for planning, traffic conspicuity etc. Such trajectory based concepts involve, *inter alia*, the ability of the ATM system to assess and update aircraft trajectories such that safe and efficient CAT operations can be conducted without en-route conflicts or inefficient stacking and holding procedures. Trajectory-based routing will have enormous repercussions for GA integration and safety, which are currently little-known and should be researched.

5.37. What more could be done to encourage the aviation industry to adopt new technology to reduce its climate change impacts?

No comment

5.38. What more can the UK aviation industry do to reduce the climate change impact of its ground operations and surface access to and from the airport (which can also help reduce local environmental impacts)?

No comment

5.39. What scope is there to influence people and industry to make choices aimed at reducing aviation's climate change impacts, e.g. modal shift, alternatives to travel, better information for passengers, fuller planes, airspace management (which can also help reduce local environmental impacts)?

No comment

Local impacts

5.40. What do you consider to be the most significant impacts – positive and negative - of aviation for local communities? Can more be done to enhance and / or mitigate those impacts? If so, what and by whom?

No comment

5.41. Do you think that current arrangements for local engagement on aviation issues, e.g. through airport consultative committees and the development of airport master plans, are effective? Could more be done to improve community engagement on issues such as noise and air quality? If so, what and by whom?

No comment

5.42. Do you think that current arrangements for ensuring sustainable surface access to and from airports, e.g. Airport Transport Forums and airport surface access strategies, are effective? Could more be done to improve surface access and reduce its environmental impacts? If so, what and by whom?

No comment

5.43. What are your views on the idea of setting a 'noise envelope' within which aviation growth would be possible, as technology and operations reduce noise impacts per plane? What do you consider to be the advantages and disadvantages of such an approach?

No comment

5.44. Is it better to minimise the total number of people affected by aircraft noise (e.g. through noise preferential routes) or to share the burden more evenly (e.g. through wider flight path dispersion) so that a greater number of people are affected by noise less frequently?

No comment

5.45. What is the best way to encourage aircraft manufacturers and airlines to continue to strive to achieve further reductions in noise and air pollutant emissions (notably particulate matter and NOx) through the implementation of new technology?

No comment

5.46. What are the economic benefits of night flights? How should the economic benefits be assessed against social and environmental costs?

GA and particularly S&RA are involved in very few night flights – this is not considered an issue for GA Alliance members

5.47. How can the night flying regime be improved to deliver better outcomes for residents living close to airports and other stakeholders, including businesses that use night flights?

No Comment

5.48. Should extended periods of respite from night noise be considered, even if this resulted in increased frequency of flights before or after those respite periods?

No comment

Any other comments

5.49. If you have comments on any strategic issues not covered in this scoping document, which you consider to be relevant to the development of the aviation policy framework, please include them in your response.

No Comment

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