
RESPONSE TO DISCUSSION PAPER 03 ON AVIATION AND CLIMATE CHANGE

SUBMISSION BY GATWICK AIRPORT LTD

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Summary

London Gatwick welcomes the opportunity to respond to this paper. We agree with the Airports Commission that the situation with regards to aviation and climate change the world has altered significantly since the 2003 Air Transport White Paper (ATWP). Analysis undertaken and views developed as part of that process would not necessarily remain valid today.

Gatwick supports the principle that aviation expansion should be considered only within the context of an appropriate environmental framework to ensure that our sector meets its climate change costs. We realise the need for, and support the development of, appropriate market based mechanisms or other policy measures to control aviation emissions in order to help meet Government emissions reduction targets.

In this response we highlight five key points:

1. Aviation can grow between now and 2050 and still make achieving the Government's carbon reduction targets a realistic prospect. This is supported by the conclusions of the Intergovernmental Panel on Climate Change (IPCC), and by Sustainable Aviation (SA).
2. Climate change impacts are a key focus point for the airport as evidenced by our commitment and achievements through our Decade of Change sustainability strategy.
3. Interdependencies are an important consideration in assessing and forecasting future carbon emissions and management strategies; and interdependencies, particularly those between carbon emissions, noise and air quality are not covered sufficiently in the discussion paper.
4. A clear policy and financial support for sustainable alternative fuels is needed from the Government in order for the aviation sector to achieve its full carbon reduction potential.

5. Climate change is likely to increase the risks of extreme weather events for all seasons in the UK. It is essential therefore that resilience is a key feature in the Commission's proposals for the UK's future airport capacity.

We would draw the Commission's attention to the recently published Sustainable Aviation (SA) CO₂ road map that illustrates in detail a realistic picture of what CO₂ reductions the industry could achieve between now and 2050, with the proper focus and investment from Government and industry stakeholders. We support this view and the conclusions presented in the SA report.

Discussion

This paper is in two parts – the Discussion which addresses several general themes and, secondly, responses to questions proposed by the Commission.

Interdependencies of carbon emissions

When assessing the environmental impacts of aviation and the drivers influencing climate change it is not possible to develop sensible robust mitigation and reduction strategies without recognising that there are several interdependencies at play. It could be relatively straight forward to devise a low carbon emissions strategy but developed in isolation, such a strategy could create significant negative impacts on air quality and noise.

This view is outlined and supported in Sustainable Aviation's 2010 paper 'Inter-dependencies between emissions of CO₂, NO_x and noise'. This paper outlines and explains that in the UK, as elsewhere, the local environment agenda for aviation is driven largely by noise and occasionally by local air quality impacts, whereas the national and international agenda is primarily focussed on climate change. Addressing these often-competing demands is a constant challenge – achieving an improvement in one area may come at the expense of another. Understanding these inter-dependencies is crucial in the decision-making process. Clear and consistent advice from the policy makers as to what should be the focus is essential in addressing the corresponding trade-offs. The Commission's paper does state that it is not considering the wider environmental inter-dependencies and we think this is a weakness.

An example of a more holistic approach is the publication by the European Commission's High Level Group on Aviation Research of a vision for aviation in 2050 entitled "Flightpath 2050"¹, calling for a reduction in CO₂ emissions per passenger kilometre of 75%, a 90% reduction in NO_x emissions and a 65% reduction in perceived noise emissions from flying aircraft. This vision is benchmarked against the capabilities of a typical new aircraft in 2000.

Sources of carbon emissions

There is an imbalance in the discussion paper around the sources of aviation emissions. Whilst it is clear the majority come from aircraft operation, there are also carbon emissions from airport and linked surface access infrastructure and these do not appear to be covered at all in the Discussion document. The Green House Gas Protocols suggest that carbon emissions should be reported and considered in three scopes, scope 1 and 2, (emissions you have influence over) and scope 3 (those that you have little influence over). From an airport operator's point of view, the majority of aircraft emissions are in scope 3. It is important when addressing global carbon emissions that all scopes are considered.

¹ Flightpath 2050, HLG, 2011

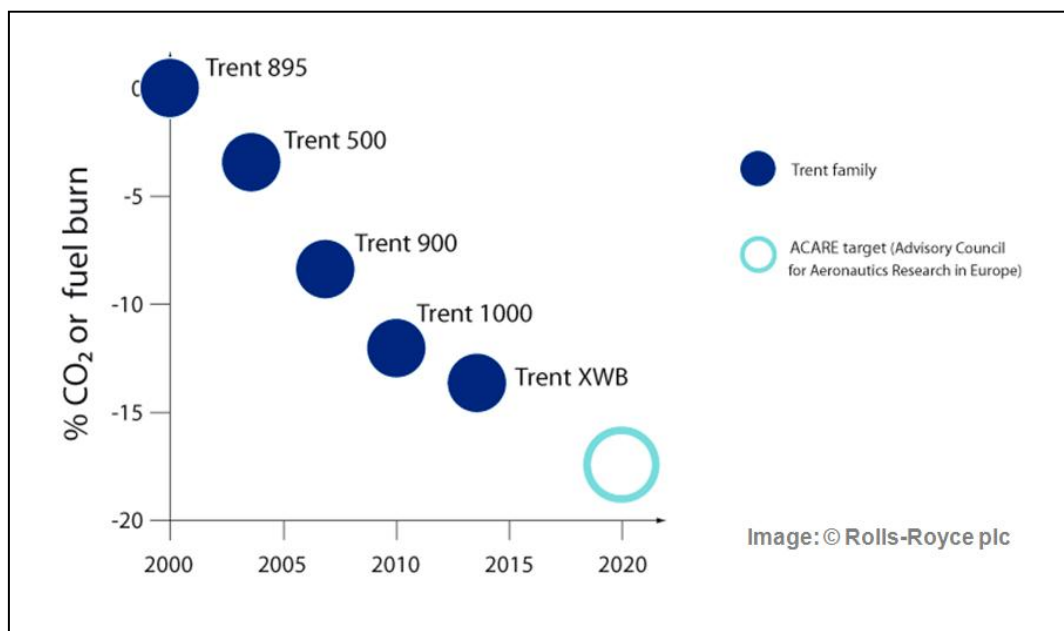
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The most recent Sustainable Aviation Low Carbon Roadmap outlines in detail emissions from all these scopes and their impacts, which can be addressed via many different channels. The areas with the greatest potential are, in our view:

- **The Snowball Effect:** The lighter an aircraft is, the less fuel it burns, and the less fuel it needs to carry. Engines are also becoming more efficient, again leading to less fuel burnt. This creates what we term the 'snowball effect'. We believe that the latest airframe technology, coupled with engines that could deliver 20% improvements in fuel efficiency, could mean a 28% reduction in the amount of fuel burnt on a transatlantic flight, as shown in Figure 1 below.

Figure 1: Fuel efficiency of successive generations of large jet engines relative to a year 2000 baseline, showing progress towards ACARE engine fuel efficiency target. (SA carbon roadmap)



- **Aircraft Design:** Many aircraft currently fly shorter routes than they were designed for. Savings in fuel could be achieved if more aircraft flew routes that matched their actual range. The commercial practicality of doing so needs further investigation. Aircraft could also be designed to fly at a lower cruising speed. Again, the cost of fuel influences how economic this is for a given airline.
- **Operational Efficiency:** Getting an aircraft into the air quickly and efficiently and ensuring that it can land without circling for too long are key. These are issues that air traffic control providers are making significant progress on, but are also related to the constrained runway capacity of some busy airports.
- **Sustainable Alternative Fuels:** Wider use of sustainable biofuels would facilitate a significant reduction in CO₂ emissions, whilst still creating an environment where the total number of flights to and from the UK could grow with a commensurate fall in the carbon emissions that the sector generates. We note the Government's assessment that the promotion of greater use of biofuels in aviation would deliver the greatest overall carbon savings whilst at the same time being the most cost-effective 'policy lever' in terms of overall cost to economy vs. tonnes of

carbon emissions saved². In our view, greater use of sustainable alternative fuels offers the best available opportunity to reduce aviation's carbon emissions, whilst maintaining its potential to boost growth.

Encouraging the role of sustainable alternative fuels

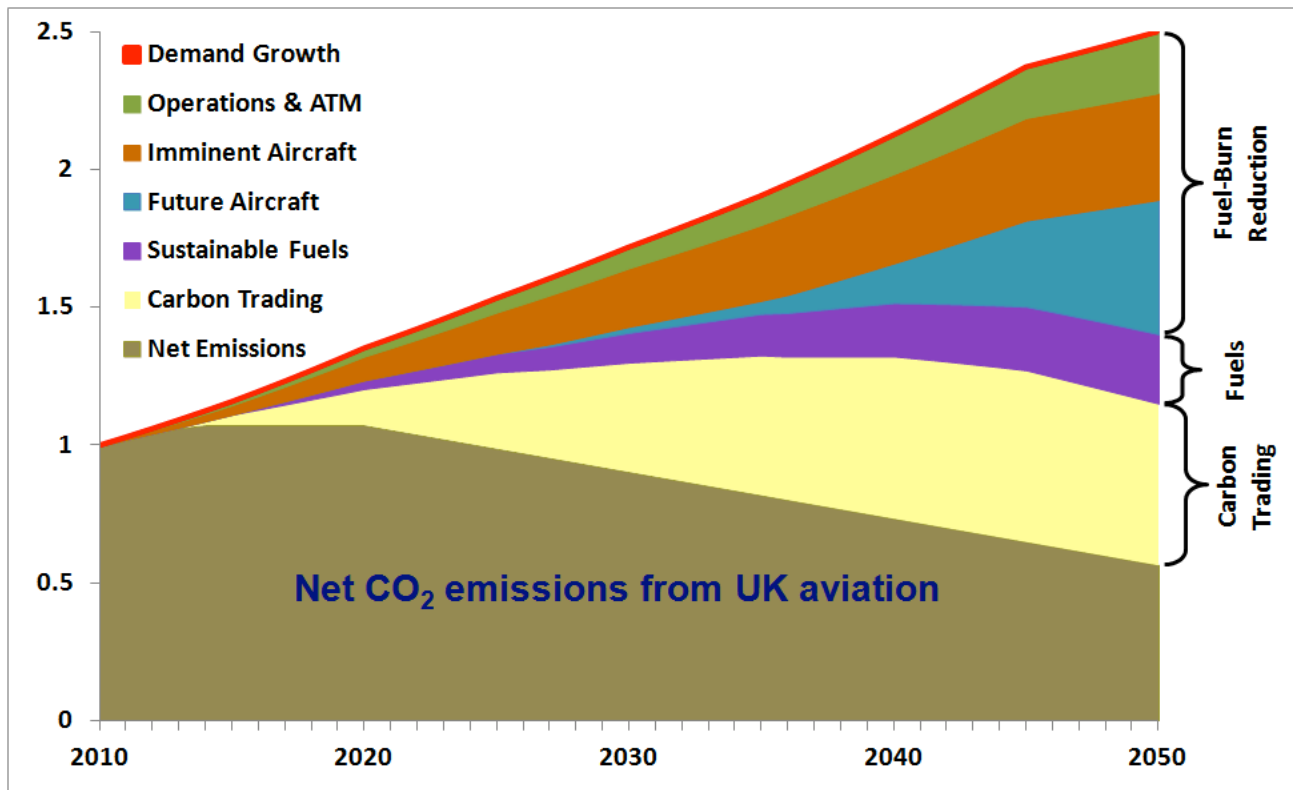
The role alternative fuels have to play is echoed in the Commission's paper, table 5.2 (page 31) and in Figure 2 below. Biofuels have an important part to play in reducing carbon emissions from aviation. It is concerning that the Government has yet to form a coherent policy on how best to support deployment of these fuels. Although consensus amongst EU Member States is important, we believe there is every prospect that a projected reduction of 18-24% in net carbon emissions from UK aviation could be exceeded if action was taken sooner. A range of policy mechanisms should be further explored by the Government as soon as possible to maximise the contribution these can make. They include:

- Direct subsidy of production. The Government could subsidise the overall production of biofuels financially, cutting the cost risk of production.
- Government interventions to reduce project specific risks (e.g. partially underwrite contingencies and provide insurance for new projects to produce biofuels). This would reduce uncertainty around unknown or unquantifiable risks, hence helping to lower the cost of capital, and could encourage more producers and suppliers.
- Soft loans/credit guarantees/ Government participation in projects. These could assist new entrants and smaller developers. They would lower the cost of capital required for the projects and be useful for new UK-based manufacturers to assist in funding initial pilot projects.
- Fast-track planning or special 'economic zones' and rent-free holidays for new manufacturing capacity. There have been cases of industry stakeholders wanting to build plants that can produce alternative aviation fuels but being halted by the planning system.
- Investment/production tax credits and tax depreciation, as has been done in the US with Wind power and Combined Heat and Power (CHP) plants.

This approach is echoed by the 'Farm to Fly' Government initiative in the USA that has recently just been granted a new 5 year extension. This scheme is a partnership between the US Department of Agriculture, Department of Defence and Boeing with the aim creating a US industry that is capable of producing 1 billion gallons of aviation biofuel by 2018. This initiative is a clear example that other countries placing a firm focus on biofuel development and this is something we suggest the UK Government replicates.

² Government Response to the Committee on Climate Change Report on Aviation, August 2011

Figure 2: Projection of CO₂ Emissions from UK Aviation (DfT forecasts)



(Sustainable Aviation CO₂ Road Map 2012)

UK aviation can accommodate significant growth to 2050 without a substantial increase in absolute CO₂ emissions. We also support the reduction of net CO₂ emissions to 50% of 2005 levels through internationally agreed carbon trading.

The role of Government

Government will need to play a key role in supporting research and development in aerospace technology, encouraging the introduction of sustainable biofuels, delivering on infrastructure projects such as the Single European Sky initiative, and working with other countries to establish a global sectoral approach for regulating international aviation emissions based on carbon trading.

Carbon 'leakage'

Chapter five in the paper discusses carbon 'leakage' from capacity constrained UK airports and suggests that constraining capacity might be an effective lever to curb carbon emissions. This may be the case but as constraining capacity may reduce or minimise emissions within the context set out in this chapter there is no account taken or mention of the economic leakage that this will create. The effect of capacity constrained airports in the UK will inevitably lead to aircraft flying from other European airports with more capacity, UK carbon emissions will go down and there will be no leakage from the EU. However there will be significant economic loss to the UK in lost business and tourism and also significant impact to the UK's ability to connect to the rest of the

world. These factors are not recognised at all in the discussion paper and we feel these are very important negative side effects that the Commission should take into account.

Gatwick's approach to managing climate change impacts

London Gatwick has taken a fresh approach to managing the environment and shortly after the airport was sold to Global Infrastructure Partners in 2009, we launched our Decade of Change sustainability strategy. The strategy sets targets for us to deliver by 2020 across all key sustainability areas. It describes how Gatwick aims to deliver sustainable growth through responsible environmental management coupled with strong economic and community programmes, a new innovative strategic direction was set. Within this strategy, Gatwick has set itself an industry leading target to reduce the airport's carbon emissions by 50% (off a 1990 baseline) by 2020. Gatwick has already achieved a 40% reduction and is well on the way to the end target.

Gatwick has already seen significant progress in its environmental efforts with independent recognition through achievement of ISO 14001, the environmental management system standard, and of the Carbon Trust Standard.

Gatwick's drive to reduce carbon emissions is being delivered through several industry firsts. Among these is Gatwick's Airport Collaborative Decision Making initiative (ACDM), which is delivering huge gains in airfield operational efficiency and tackles the interdependencies head on. As a result, Gatwick is seeing significant reductions in carbon emissions from aircraft on the ground and also reductions in their NOx emissions and the noise foot prints. We are also signatories to the SA 'Aircraft on the Ground CO₂ Reduction (AGR) Programme' (SA, 2010a), (SA, 2011). This programme was developed following two years of collaborative work involving Sustainable Aviation and its signatories, with the input of the Clinton Climate Initiative.

Gatwick is also combining this approach with National Air Traffic Service's (NATS) strategy to reduce carbon emissions by 10%. Much of this 10% will be achieved through greater efficiencies in air space design and operation and the operation of Continuous Climb Departures (CCD), Continuous Descent Approach (CDA) and the migration to state of the art navigational processes such as Precise Route Navigation (P-RNAV). All these are being trialled at Gatwick as part of its recently launched 'Fly Quiet and Clean' programme.

Through an EU-led initiative called SESAR (Single European Sky ATM Research programme), there is now a major opportunity to review fundamentally how the UK uses airspace in line with the capabilities of the current and the next generation of modern aircraft and navigational aids. The review will bring significant operational efficiency benefits as well as significant environmental improvements. A more efficient air traffic management system will also deliver greater resilience against weather events and unforeseen delays. Optimising these locally will offer significant improvements, but best results will be achieved through network wide deployment, starting with a European approach.

Within the South East of the UK, a major long term airspace review, which sits within SESAR, will deliver a redesigned airspace for all of London's airports - the London Airspace Management Programme (LAMP). LAMP, which is not scheduled to begin implementation in 2018, will redesign the airspace above 4000ft. However there is also a significant opportunity before this time to redesign the terminal airspace (below 4000ft) for which the airport, along with NATS, is directly responsible. For example, it is possible to make more efficient use of Gatwick's runway by modifying existing Standard Instrument Departure routes (SIDs) increasing the number of routes a departing aircraft can use. Changing transitional altitudes that the SIDs serve will allow aircraft to

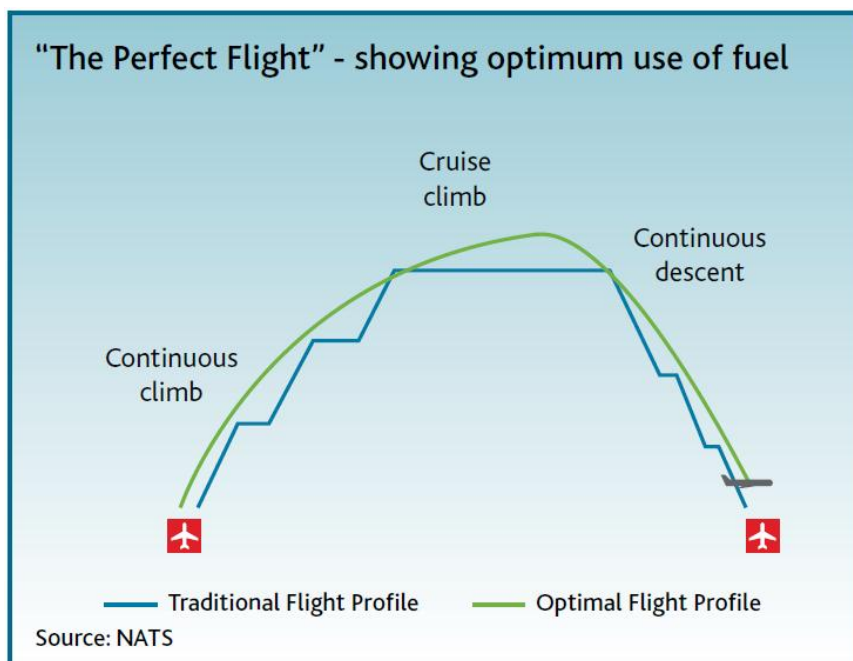
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climb faster and reduce noise impact on the ground. Gatwick is also looking at options to change the way arriving aircraft are handled by NATS in order to provide noise respite and carbon savings by removing the need for stacking. These techniques, and others, are not currently used in the UK, but are common practice in other countries around the world.

We are assessing the opportunity to implement an airspace redesign at Gatwick in advance of the 2018 LAMP schedule in order to give significant resilience to our ability to deliver 55 aircraft movements per peak hour, allow us to deliver significant carbon emissions and reductions in noise impacts for people on the ground.

Allowing aircraft to follow fuel-optimal routings and altitude profiles as shown in Figure 3 below, offers the potential for significant reductions in CO₂ emissions. Minimisation of queuing and holding offers some further scope for CO₂ reduction. The Civil Air Navigation Services Organisation (CANSO) in 2008 assessed the efficiency of global ATM provision and concluded that there exists an opportunity to improve global ATM efficiency by an average of 3 to 4 percentage points. However, the same report also makes clear that current ATM efficiencies in Europe are a few percentage points lower than the global average. This leads to a greater than average opportunity for ATM-related improvement in Europe. (SA CO₂ road map 2012)

Figure 3: Distinction between typical stepped altitude profile and the optimal altitude profile which reduces fuel-burn. Source: (SA, 2011)



Responding to the Commission's questions

In the second part of this paper we turn to the questions put by the Commission in paragraph 7.2 of its discussion paper.

1 Do you consider that the DfT CO₂ forecasts present a credible picture of future aviation emissions? If not, why not?

- 1.1 Gatwick believes that the DfT forecasts support fully the need for additional capacity, and specifically in the London region. This is explained in our response to question 1 of the recent Demand Forecasting paper. It is clear from the DfT forecasting results that in a constrained capacity scenario there would be a decrease in the number of passengers handled in 2050 by London airports of around 32% against unconstrained forecast. Set against a UK carbon impact this will result in carbon savings for the UK although a substantial proportion will be classed as leaked as outlined in section five of the Climate Change paper. We believe strongly that more work is required in this area to clearly understand the effects of constrained growth on carbon leakage, its impacts on UK, European and global carbon emissions and the resultant economic impacts.

We also believe that the DfT forecast for penetration of biofuels is too low. We endorse and support the figure outlined in the Sustainable Aviation CO₂ road map. We fully expect that penetration will be greater than 2.5% by 2050 particularly if the Government provides more support in this area in line with the approach outlined in SA's CO₂ road map.

Accordingly, we believe that by 2050, sustainable fuels could offer between 15 and 24% reduction in CO₂ emissions attributable to UK aviation. This assumption is based on a 25-40% penetration of sustainable fuels into the global aviation fuel market, coupled with a 60% life-cycle CO₂ saving per litre of fossil kerosene displaced.

2 To what extent do you consider that the DfT forecasts support or challenge the argument that additional capacity is needed?

- 2.1 Gatwick believes that the DfT forecasts support fully the need for additional capacity, particularly in the London area. The need for additional capacity in London is clearly demonstrated by comparing the forecast levels of future unconstrained and constrained passenger demand across London's six airports. In 2030, the DfT forecasts that the London airports would handle a combined 198 million terminal passengers without capacity constraints, but this number will fall by 12.6 million passengers, or 6.4%, due to capacity limitations. The impact of capacity constraints in London is far more severe in 2050, when London's airports would be unable to accommodate 94 million passengers, or 32% of unconstrained demand, due to insufficient airport capacity (see DfT UK Aviation Forecasts, 29 January 2013, Annex tables D.8 and E.2, Central Case).

As regards UK connectivity, data in the Commission's recently published Demand and Forecast paper highlights the forecast difference in the number of international destinations served from major UK airports, and for the London airport system as a whole, under the unconstrained and constrained forecast scenarios. According to these projections, the London airports system in 2050 would suffer a loss of 15 total international routes, dropping from 245 unique international destinations served under the unconstrained forecasts to 230 international destinations under the constrained scenario.

3 How could the analysis be strengthened, for example to allow for the effects of non-CO₂ emissions?

- 3.1 Knowledge of the non-CO₂ effects of aircraft emissions is still limited but it is likely they cause additional climate warming. The impacts of NO_x and contrails should be considered separately from the impact of CO₂, rather than being treated as equivalent to CO₂ emissions. We share the SA view that an approach that addresses all the climate change impacts of air transport based on robust science and sound economics is needed before conclusions are reached. The on-going development of non-CO₂ climate science is a necessary step in guiding the aviation industry in the right direction to find genuinely sustainable solutions for the future.

Further research is clearly necessary to improve understanding of the non-CO₂ effects, in particular those related to contrails, cirrus clouds and NO_x. This is evident from figure 2.1 in the Commission's Climate Change paper showing a broad range of estimated impacts from various radiative forcing components.

4 How can we best deal with uncertainty around demand and emissions, including in relation to future carbon prices?

- 4.1 Accurately forecasting aviation demand and emissions is always going to be difficult as there are many influencing factors and interdependencies that can all impact the final figures arrived at, not least carbon pricing. Carbon emissions and their impact on climate change is a global issue and attempts to develop country specific management solutions can only serve to create commercial conflicts and anticompetitive behaviour across industrial sectors that are global in their reach and operation.

We agree with the SA view that there is no climate impact of international aviation that can be confined to the UK alone. Emissions from the aviation sector which impact the global climate must be addressed at a global level, through appropriate international bodies such as ICAO. The UK Government should continue to support work through such international organisations to achieve effective international measures, in particular trading, while working to ensure that international aviation emissions are excluded from national emissions inventories.

We endorse and support the statements made in the SA low carbon road map document that outlines a pathway to significantly greater CO₂ reductions as aviation grows than the DfT forecasts, in fact the SA paper projects some 22% more. As shown by Figure 4 and Table 1 below, the industry and the Government in the UK have arrived at different results when trying to assess the impact of emissions, this is replicated around the world and it is therefore no wonder that arriving at a global consensus for demand and carbon emissions is very difficult. We believe the most sensible way forward is to arrive at number of scenarios based on a low, middle and high basis, using a take no action as worst case and a best case view that takes into account all available carbon reduction potential.

Although fuel prices and aircraft technology advances will have a significant impact on CO₂ emissions and demand. A clear Government policy to address aviation capacity in the UK along with greater certainty around a carbon trading mechanism and a commitment to support alternative fuels will produce much more certainty around likely demand and therefore carbon emissions. In addition, the current volatility surrounding the EUETS driven by the strong opposition from some international carriers is creating an unstable carbon trading platform and is not enabling confident carbon price forecasts to be arrived at.

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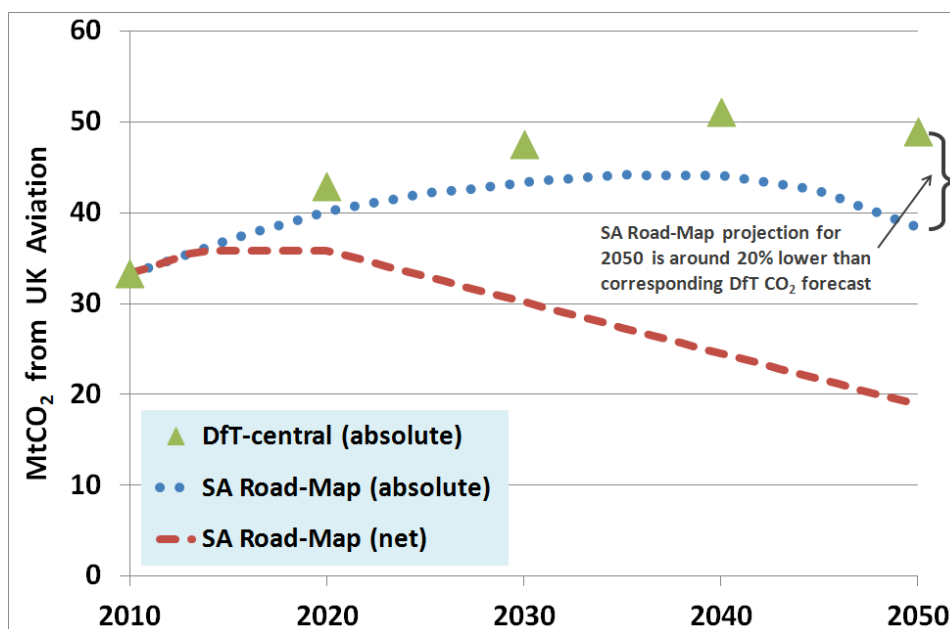
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A greater focus on all the interdependencies is also required in order for true carbon emissions to be quantified. Accurately assessing the impacts of interdependencies is not an easy piece of work but more attention needs to be given to this area.

Table 1: Comparison of CO₂ mitigation assumptions responsible for the differences set out in Figure 4 below

		DfT, 2013	SA CO ₂ Roadmap	
ATM and Operations		0	9 %	
Sustainable Fuels	2030	0.5 %	8 %	
	2050	2.5 %	18 %	
<u>New aircraft</u> efficiency improvement relative to 2000	to 2020	Various	NB ⁸⁷ 13 %,	WB ⁸⁸ 17 – 20 %
	2020-2030	17.5 - 21.5 %	NB 35 %	
	2030-2040	24.5 – 27.5 %		WB 50 – 54 %
	2040-2050	29.5 – 31.5 %		
Carbon Trading	2050	0	As required to reduce net CO ₂ emissions to 50% of 2005 levels	

Figure 4: Comparison of SA's view of absolute and net emissions in relation to DfT's "Central" CO₂ forecasts



5 What conclusions should be drawn from the analysis of effectiveness, and relative cost, of airport capacity and other abatement measures in Chapter 5? Are there alternative analytical approaches that could be used to understand these issues?

- 5.1 It is currently difficult to draw firm conclusions in this area, because of knowledge gaps and the lack of reliable data e.g. carbon price alone will cause major variations in output. This is a critical point because aviation investment decisions could potentially be based on periods of over 30 years.

We do not support the theme detailed in Chapter 5 of the Commission's discussion 'Abatement Potential of Capacity Constraints and other levers'. We believe that ensuring capacity constraints in UK aviation is a poor mechanism to drive emission reductions that impact climate change on a global level due to the stated fact that carbon emissions would just leak into other EU airports with greater capacity. This section in the paper gives the impression that somehow capacity constraints has been an active strategy to help reduce carbon emissions. This impression is of course not representative of reality and capacity constraints have principally been a side effect of a lack of clear Government policy.

The behavioral change section within 5.21 of the discussion paper is a little weak, yet the approach is rated as second most cost effective in terms of £/TCO₂ in table 5.2. In reality, behavioural change will occur for one of three reasons:

- prohibitive cost of flying
- non availability of route/flight
- a change of mindset towards one of reducing/eliminating flying on and individual/family or business basis

Behavioural change is not an approach supported by Gatwick. We believe the long term solution to managing the industry's carbon emissions lies in delivering alternative low CO₂ fuels in conjunction with other technological advancements. This will allow aviation to grow and meet demands from passengers in a sustainable manner ensuring the economic prosperity of the UK.

As acknowledged by the Commission's paper, account is not taken of air quality, noise and economic impacts. We believe the most accurate assessment CO₂ emissions cannot be arrived at when only considering carbon and capacity in isolation. Additional environmental effects and existing policies need to be factored in.

6 Are there examples of how other countries have considered carbon issues in relation to airport capacity planning that we should be looking at? (Please specify and briefly explain)

- 6.1 Not that we aware.

7 What do you consider to be the main climate risks and adaptation challenges that the commission will need to consider (a) in making its assessment of the UK's overall aviation capacity and connectivity needs, and (b) in considering site-specific options to meet those needs?

- 7.1 There are several climate change risks that need to be considered when assessing UK airports, broadly these cover, flooding, snow, ice and extremes of temperature. Due to the

different locations of UK airports, regional conditions bring different climate issues for the aviation sector.

Weather Risks will include -

- **Increased frequency of extreme weather events** - potential for flight diversions, delays and airport closures, particularly from snow.
- **Increased temperatures/heat waves** - potential for increase in surface and subsurface damage to runways and aprons from extreme heat.
- **Increased rainfall and flood risk** - which can cause surface water flooding and exceed drainage capacity, leading to reduced air traffic flow capacity and accident risk.
- **Seasonal increases in fog** - potential for increased disruption caused by low visibility procedures (LVPs).
- **Increased lightning** - can cause changes to flight routings and stack locations to avoid convection storms.
- **Increased freeze/thaw effect** - damage to surfaces if winter temperatures become more variable, fracture risk to underground utilities and infrastructure.

There are also more general effects such as;

- **Interdependencies** - particularly with the wider transport sector, water sector, energy sectors and the telecoms sector.
- **Global Risks** - such as potential for changes in the distribution of diseases, epidemics and pandemics, resulting in travel bans or reduced demand for air travel.
- **Subsidence** - increased risk due to changes to the water table.
- **Specific Air Traffic Control Risks** - changes in prevailing wind conditions affecting runway utilisation through reductions in take-off and landing rates causing backlog, delays etc. Permanent change could require realignment of runway direction although current climate projections do not suggest any likely change in the prevailing wind.
- **Jetstream movement** - requiring changes to aircraft flow patterns and sector loading and could result in preferred transatlantic routes moving further north outside NATS's controlled airspace.
- **Increased low pressure storm conditions and high wind speeds** - causing air traffic flow reductions, increased aircraft separation and missed approaches - leading again to delay and backlog and potentially, short-term runway closures.

The Climate Change Act 2008 provides the Secretary of State with the Adaptation Reporting Power, to encourage and influence key organisations adaptation actions. In the first strategy for using the Power, just 91 organisations were targeted. These organisations

are largely responsible for national infrastructure in the energy, transport and water sectors which are sectors of strategic importance to the country.

In 2011 London Gatwick submitted a full climate change adaptation report to the Department for Environment, Food and Rural Affairs (Defra). The report was endorsed and published by Lord Taylor in October 2011. The report outlines our approach to climate change adaptation assessment and details some activities we are already engaged in to adapt to climate change. In assessing the risks from climate change Gatwick assumed the worst case scenario for its region as modelled by UK Climate Impacts Programme (UKCIP) and assessed the risks up until 2050.

In total, we have prioritised 21 climate change risks, of which snow/ice and flooding are the key risks we have chosen to focus on. Flooding from extreme weather events was identified as a priority risk for the airport and significant analysis and assessments have been carried out both on and off airport to quantify this risk. In 2009, the airport joined in partnership with the Environment Agency to deliver an off-site flood attenuation scheme that not only provided a significant reduction in flood risk to local communities around the airport but also significantly reduced flood risk for the airport. This process led to agreeing principles for how new development in flood risk areas could be taken forward without each individual on-airport development being required to mitigate for flood impacts. This built on an approach adopted by the EA and the owners of Thorpe Park. It is the first time that a UK airport has put in place an arrangement of this kind.

Gatwick has also invested over £9 million in snow clearing and de-icing equipment at Gatwick and is now as well equipped as Oslo airport to deal with harsh winter conditions. In the last few years this investment has made a significant impact on our ability to remain operational during periods of cold temperatures and snow fall. In fact last winter the airport did not close at all.

Lastly analysis of climate change risks to aviation makes it very clear that ensuring resilience within the UK airport sector is critical. A capacity constrained airport system in the UK will offer little or no protection against the identified climate change risks. Recovery from a relatively minor weather event will take a considerable amount of time causing stress and hardship for thousands of passengers and impacting directly on the connectivity needs of the UK.

8 Are there any opportunities arising from anticipated changes in the global climate that should be taken into account when planning future airport capacity?

- 8.1 In our view, there would be less impact on climate change and fewer associated risks to consider from placing additional capacity at an existing airport rather than creating a brand new airport as this will significantly increase concrete run-off footprint and add to flooding risks. Expanding an existing airport would also reduce the impact on utility supply infrastructure and reduce pressure and competition for utilities between airports and domestic consumers.

Other issues arising from anticipated changes in the global climate that should be considered include:

- **Self-generation of renewable energy** - a number of airport operators have highlighted the potential opportunities of renewable energy generation, for example through biomass or photovoltaics.

- **Reduced energy costs** - warmer temperatures in future may reduce the heating season although this may be outweighed by increased cooling demand.
- **New management processes and policies** - such as increased energy and water efficiencies, opportunities to exploit rain water harvesting from wetter winters and milder winters resulting in a longer outdoor work season.
- **Changes in passenger flows and travel destinations** - the UK could be seen as a better holiday location, particularly if other countries and their airports fail to adapt.

However, a review of the published Adaptation Reports identified a number of barriers which represent a challenge to the aviation sector's ability to adapt to climate change. These include:

- Airports usually have relatively short-term timeframes for return on investment, whilst climate change requires longer term investment which looks unattractive to shareholders. Even the airports master planning timescales of 20 years is not long enough to prepare for climatic changes.
- Regulatory constraints on investment - airport capital investment programmes are regulated in 5 year periods by the CAA with costs having to be agreed in advance. This cycle does not match the long term timescales associated with climate change.
- Future climate change regulation such as increased legislative constraints and levels of fiscal taxes may impact upon airports' ability to invest in appropriate infrastructure.
- Airfield and aviation safety regulations.
- Permitting constraints e.g. night flight quotas and noise footprints

9 Conclusion

- 9.1 CO₂ emissions from UK aviation currently amount to around 5-6% of CO₂ emissions from aviation worldwide. Whilst UK aviation's growth rates to 2050 will average around 2% per annum (DfT, 2011), global growth rates are expected to be considerably higher due to the rapid development of emerging markets in Asia and elsewhere. As a result in our view, the proportion of global aviation's emissions attributable to the UK is likely to diminish over time.

However that said the most compelling opportunity for the UK to exert an influence over CO₂ emissions from aviation is not by constraining demand for UK aviation, but rather through investment in advanced technologies which can be deployed globally, earning export revenues for the UK while contributing to a more environmentally efficient industry world-wide. This would then allow for sustainable growth in the UK aviation sector ensuring UK connectivity and protecting the valuable contribution the industry makes to the economy.

The industry has already demonstrated significant carbon savings. Analysis by IATA (IATA, 2010) has shown that global commercial airline fuel efficiency has improved by over 30% in the past two decades, saving over 400 million tonnes of CO₂ per annum at current activity levels, relative to the fleet efficiency in 1990. In contrast, total annual emissions of CO₂ attributable to UK aviation correspond to less than one tenth of this figure. In line with

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IPCC we believe that aviation can grow by around 60% and still achieve the Governments carbon emissions reduction targets.

However in order to achieve this sustainable growth, there need to be continued technological advances and developments and there will need to be significantly more support from Government to develop alternative fuels and a workable solution to carbon trading. These measures combined with the operational savings achievable from airspace changes and efficiencies in ground operations, will deliver the headroom which enables the industry to grow, whilst achieving the governments emission targets.

Gatwick Airport Ltd
16th May 2013