



A strategy towards sustainable development of UK aviation

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Foreword

RT HON TONY BLAIR PRIME MINISTER

Aviation is an increasingly important form of transport, providing vital connections to the wider world for both passengers and goods. It has seen a five fold rise over the past 30 years and has played a key role in generating economic growth both here in the UK and abroad.

But aviation also impacts on the environment, both at the local level and internationally through its growing contribution to climate change, which is perhaps the most important issue facing the global community. So government and industry have a responsibility to work together to tackle these issues - as we are doing. There is now wide agreement that emissions trading is the most effective way of tackling aviation's contribution to climate change. Other measures, such as carbon offsetting, also have an important role to play which is why Government is committed to applying offsetting to central government air travel from April 2006.

In the Future of Air Transport White Paper, published in 2003, the Government recognised that we had to strike a balance between the economic benefits of aviation and the environmental challenges it creates. Industry itself has a key role in addressing these challenges which is why I am delighted that such a wide range of organisations have worked together on Sustainable Aviation. By working with government and society to tackle the environmental issues associated with aviation, the industry can demonstrate that economic success, social progress and respect for the environment can go hand in hand.

Tony Blair

Image acknowledgments

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Joint statement

BY TRADE ASSOCIATIONS AND NATS

The trade associations of the UK aviation industry (AOA, BATA, SBAC)¹ and National Air Traffic Services (NATS), welcome the publication of Sustainable Aviation. We believe that the strategy outlined marks a significant step-change in aviation's response to the environmental issues and signals our commitment to the long-term sustainable development of our industry.

We are delighted that so many members of our industry have agreed to endorse this strategy, and implement the commitments detailed within it. The presence of these leading aviation companies will ensure that Sustainable Aviation becomes the benchmark for the sector. We intend to work very closely with the signatory companies to strengthen the commitments and increase participation as we move towards the first update of Sustainable Aviation in the autumn of 2006.

We are convinced that the strategy is a responsible, coherent response to the challenges facing our industry, particularly issues surrounding the environment, and we especially welcome the positive response of the Government to it. Aviation is a global industry and it will require the leadership of both business and government to achieve a sustainable future for aviation on an international basis.



Extracts

AVIATION IN THE UK

"Air travel is essential to the United Kingdom's economy and to our continued prosperity. In the last 30 years there has been a five-fold increase in air travel. And it has opened up opportunities that for many simply did not exist before; half the population flies at least once a year, and many fly far more often than that.

The challenge we face is to deal with the pressures caused by the increasing need to travel whilst at the same time meeting our commitment to protect the environment in which we live.

Our economy depends on air travel. Many businesses, in both manufacturing and service industries, rely on air travel; and it is particularly important for many of the fastest growing sectors of the economy. Visitors by air are crucial to UK tourism. Air freight has doubled in the last 10 years; one third by value of all goods we export go by air."

Source: Foreword to the Future of Air Transport - Government White Paper (2003)

"Aerospace in 2003 is one of the most vibrant and successful sectors of UK industry. High-technology skills in engineering, electronics, software and many other areas have established the UK Aerospace industry as the largest after the US....The UK Aerospace sector is second only to pharmaceuticals in terms of value-added per head in the manufacturing area."

Source: Executive Summary of the Aerospace Innovation and Growth Team Report (2003)

Executive summary

This document presents the strategy developed by the UK aviation industry to respond to the challenge of building a sustainable future. Development has involved reference to government guidance and the UK sustainable development strategy, as well as considerable cross-sector cooperation and wider consultation beyond the aviation industry.

Future growth presents a major challenge to the sustainable development of the industry. In particular, the industry recognises that the challenge of the growing contribution of aviation to the man-made impact on the global climate will require new approaches. Bearing in mind that currently foreseen technology advances will not offset emissions increases associated with projected growth, more needs to be done. A range of measures, including operational and market-based controls, has to be considered.

The UK aviation industry has, over the years, made significant progress in recognising and addressing its environmental impacts. All of the sectors, manufacturing, airports, airlines and air navigation service providers, have worked consistently to promote an international approach to aviation environmental issues. The need to continue to build on this work is accepted, as is the need to identify and address aviation's impacts in line with a number of fundamental principles, such as the "polluter pays" principle. For aviation, the context of sustainable development must include acknowledgement of some key features, for example the long lead-times for the implementation of new technology and the lack of alternatives to fossil fuel.

The strategy outlines the major sustainability issues faced by the industry as a whole, identifying goals to which each endorsing company will contribute according to its own respective role. These goals are listed opposite.

- ▶ Full industry commitment to sustainable development, and a broader understanding of the role of aviation in a sustainable society.
- ▶ Aviation incorporated into a global policy framework that achieves stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man-made interference with the climate system.
- ▶ Limit and, where possible, reduce the number of people affected by aviation noise in the UK.
- ▶ Industry playing its full part in improving air quality and meeting air quality regulatory requirements at sensitive airport locations.
- ▶ Industry playing its full part in the development of an integrated transport system.
- ▶ Continue to manage and limit the industry's overall environmental footprint.
- ▶ A competitive and commercially viable aviation industry making a positive contribution to the UK economy.
- ▶ An industry with constructive relationships with employees, local communities, customers and industry partners, meeting society's air transport needs.

Specific commitments have been identified, driving towards these goals. Indicators have been proposed relevant to each goal. Some of the key commitments are listed in the box below; full details of these and the other commitments are given in the goals and commitments section.

Sustainable development - some UK aviation industry commitments

- ▶ Progressively strengthen the Sustainable Aviation goals, and encourage all aviation companies to endorse the strategy and participate in its delivery.
- ▶ Report formally and publicly on progress towards the Sustainable Aviation goals and commitments every two years, with the first review in the autumn of 2006.
- ▶ Airline and airport signatories to build support and assist policymakers in developing practical solutions for inclusion of aircraft CO₂ emissions in the European Union Emissions Trading Scheme by 2008 as a first step towards a global approach.
- ▶ Propose appropriate mechanisms by 2012 for mitigating non-CO₂ effects based on a consensus of scientific understanding.
- ▶ Demonstrate continual improvement, based on new aircraft of 2020 relative to equivalent new aircraft in 2000, towards targets including:
 - ▶ improve fuel efficiency by 50% per seat kilometre including up to 10% from ATM system efficiencies
 - ▶ reduce NOx emissions by 80%
 - ▶ reduce perceived external noise by 50%
 - ▶ instituting a formal UK industry review in 2008 and 2012 of progress towards achievement of these goals to inform, and redirect as appropriate, actions needed at the European level to ensure delivery of the goals.
- ▶ Develop and promote low-noise flight procedures through evaluation of future operational methods and implementation of best practice, for example:
 - ▶ evaluate implementation of steeper and curved approaches for noise abatement at relevant airports
 - ▶ complete a Continuous Descent Approach outreach programme at all main UK airports by end of 2006
 - ▶ assess the possibility of a best practice guide for environmentally optimum departure procedures, balancing noise and local air quality, by end 2006.

The strategy upholds the industry's international competitiveness, and is designed to ensure that the measures taken are technically feasible, environmentally beneficial, and economically reasonable.

Developing the strategy has united the key players in the UK aviation industry - airports, airlines, manufacturers and the main air navigation services provider. It is the collective response of the industry to the Government's White Paper on 'The Future of Air Transport' and to a direct recommendation of the Department of Trade and Industry's Aerospace Innovation and Growth Team.

The industry's ability to achieve some of these goals depends upon a collaborative approach with our world aviation partners, particularly the International Civil Aviation Organisation (ICAO), European Union legislators and the UK Government. This collaborative approach must also extend to other stakeholders including local communities, Non-Governmental Organisations and employees. The industry will seek to play its part in the review of the 2003 White Paper, and commits to lead by example to promote sustainable development across the broader international aviation sector. Additionally, recommendations have been identified for the UK Government to assist the delivery of this strategy.

This sustainability strategy represents the first, important, step in an iterative process. Signatories have committed to a periodic review, to ongoing consultation and to refine the strategy, in order to ensure that it is continually strengthened and remains relevant to its goals.

The strategy:

- brings together the key players in commercial aviation in the UK: airports, airlines, manufacturers and the air navigation service provider
- provides an opportunity for wider stakeholder input
- provides a basis for demonstrating the past and future commitment and performance of the UK aviation industry to meet the sustainability challenge
- responds to the request in the Air Transport White Paper, "The Future of Air Transport" (2003)
- responds to a direct recommendation of the Aerospace Innovation and Growth Team² (AeIGT), as a result of which the development of this strategy was commissioned.

This strategy is fully endorsed by the following companies:

Airlines:

*British Airways
First Choice Airways
flybe
Monarch
Thomas Cook
Thomsonfly
Virgin Atlantic*

Air navigation service provider:

National Air Traffic Services Ltd

Airports:

*BAA (Aberdeen, Edinburgh, Gatwick, Glasgow, Heathrow, Stansted, Southampton)
Belfast City
Birmingham International
Bristol International
Glasgow Prestwick International
Leeds Bradford
London City
Manchester Airports Group (Bournemouth, Humberside, Manchester, NEMA)
Newcastle International
Peel Airports Group (Durham Tees Valley, Liverpool John Lennon, Robin Hood Doncaster Sheffield, Sheffield City)
TBI Group (Belfast International, Cardiff International, London Luton)*

Manufacturers:

*Airbus UK Ltd
BAE SYSTEMS PLC
Bombardier Aerospace, Belfast
Cobham plc
Defence Aviation Repair Agency (DARA)
Doncasters Ltd
GKN plc
Marshall of Cambridge Aerospace
Meggitt PLC
Messier-Dowty Ltd
Rolls-Royce PLC
Smiths Group plc*

Aviation in a sustainable society

This section sets the context for aviation in a sustainable society and identifies the key features of aviation that influenced the development of this strategy.

1. Vision

Our vision for 2020 and beyond is the UK aviation industry meeting the needs of society for air travel and transport, while removing or minimising any negative impacts on the local and global environment and maximising its contribution to the UK economy.

2. A UK strategy for sustainable development

The UK Government and the Devolved Administrations have recently updated their sustainable development strategy³, focusing on the steps that need to be taken to turn words into actions. The new framework goal for sustainable development is set out below.

The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations.

For the UK Government and the Devolved Administrations, that goal will be pursued in an integrated way through a sustainable, innovative and productive economy that delivers high levels of employment; and a just society that promotes social inclusion, sustainable communities and personal wellbeing. This will be done in ways that protect and enhance the physical and natural environment, and use resources and energy as efficiently as possible.

Government must promote a clear understanding of, and commitment to, sustainable development so that all people can contribute to the overall goal through their individual decisions.

Similar objectives will inform all our international endeavours, with the UK actively promoting multilateral and sustainable solutions to today's most pressing environmental, economic and social problems. There is a clear obligation on more prosperous nations both to put their own house in order and to support other countries in the transition towards a more equitable and sustainable world.

The focus of the Government's strategy is on integration and on the following five guiding principles:

- ▶ living within environmental limits
- ▶ ensuring a strong, healthy and just society
- ▶ achieving a sustainable economy
- ▶ promoting good governance
- ▶ using sound science responsibly.

There are a number of key events and processes which have influenced this strategy, in addition to the Government's Sustainable Development Strategy. Four worthy of note are:

- ▶ the Air Transport White Paper, "The Future of Air Transport", published in 2003
- ▶ the Aerospace Innovation and Growth Team was established in 2002 at the request of the Secretary of State for Trade and Industry to look at the future of the Aerospace Industry in the UK
- ▶ the National Aerospace Technology Strategy, arising out of AeIGT
- ▶ the work of the Advisory Council for Aeronautical Research in Europe (ACARE).

3. Role of aviation

By bringing people together, airlines contribute to business, to political understanding and to cultural interchange. Through the facilitation of exchange of knowledge and ideas, aviation acts as a spur to innovation and stimulates economic growth and development. Air travel has helped Britons and those from other nations develop a deeper understanding of the world and of the role of their nations in the world. It also provides a highly valued service in its own right, as the desire to travel becomes increasingly important in prosperous societies.

Aviation plays an important part in the economy and life of the UK. As an island nation, the UK is dependent upon its aviation links for economic growth and social development in the 'global village' of the 21st Century. Aviation in the UK makes a £14bn value added contribution to the UK economy, supporting 675,000 jobs, has exports of £13bn p.a., and is directly responsible for transporting a third by value of our goods⁴.

However, economic growth has consequences for our planet. Aircraft, along with other forms of long distance

transport, use large amounts of fossil fuels, emit greenhouse and other gases and cause noise pollution. Airports take up land and cause traffic congestion. The aviation industry consumes significant amounts of resources. These are facts that the UK aviation industry accepts and recognises.

The challenge for aviation is to make the optimum input to the transition to sustainability through economic contribution, environmental performance and social and natural resource responsibility and to embed sustainability at the heart of aviation in the 21st century. The strategy recognizes that it is not possible to eliminate all adverse impacts but rather seeks to minimise such impacts and maximise benefits.

This document seeks to define solutions to these challenges and describe what the aviation industry can achieve in the medium and long term. The sustainable development and prosperity of an industry are inextricably linked; one cannot exist without the other.

4. Key features of aviation

There are a number of key features of the aviation industry that are relevant to the development of this strategy.

- ▶ Significant externalities (see box on page 13): noise, and land related issues have historically been major externalities of the industry together with impacts on local air quality. With the increasing awareness of its significance, climate change has become of major importance. There are also positive externalities in the form of benefits to the wider UK economy.
- ▶ The long term nature of the industry: new technology developed today will be incorporated in new aircraft types that will be flying for many years to come.
- ▶ Long term growth: the UK industry has experienced rapid growth of around 4-5% per annum over the last 30 years and demand is forecast to continue to grow at some 4-5% over the next 30 years.

- ▶ Developing scientific knowledge: aviation has a variety of climate change impacts which are very different from those of ground based sources; and the impact of aircraft exhaust gases on climate is not fully understood.
- ▶ Strategic significance: aviation is widely viewed as a strategic industry. As a consequence, governments have tended to play a significant role in the development and management of the industry.
- ▶ Safety: aviation has an enviable safety record which must be maintained.
- ▶ Technological limits: continued dependence on fossil fuel technology for the foreseeable future.
- ▶ Airspace: controlled airspace over the UK is a finite resource with many competing demands for its use.

At times civil air traffic has to use non-optimal routes in order to avoid areas of airspace used by other groups. To use the available airspace most efficiently, NATS and the Ministry of Defence have set up the Joint Future Airspace Design Team which enables joint development of future en-route airspace structures. It is the role of the Civil Aviation Authority's Directorate of Airspace Policy (DAP) to ensure that the needs of all users are accommodated, as far as possible, with regard for safety as well as environmental, economic and national security considerations. In pursuit of this, the DAP airspace change process requires consultation with all airspace users when new (or changes to existing) airspace or procedures are proposed. This process of consultation seeks to balance the differing needs of airspace users. As the UK's principal air navigation service provider, NATS plays a key role in the social, environmental and economic performance of the aviation industry.

³ DEFRA, 2004. Securing the Future - delivering the UK sustainable development strategy.

⁴ Sources: aviation figures from the Air Transport White Paper, The Future of Air Transport, 2003; civil aerospace figures derived from Society of British Aerospace Companies, Facts and Figures, 2003.

5. Principles

As this strategy develops the following important principles will be taken into account:

POLLUTER PAYS PRINCIPLE

The Rio Declaration on Environment and Development (1992) defined the Polluter Pays Principle as follows: "National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment" (Principle 16). Many aviation externalities have already been internalised, in part at least, by the application of environmental regulations, certification requirements for aircraft design and operation, and through airport charges.

ACHIEVING SIMULTANEOUS PROGRESS

Economic, social and environmental aspects are core elements of sustainability. There is a need to achieve simultaneous progress on all these elements rather than progress in one or two of the areas at the expense of the others.

PRECAUTIONARY PRINCIPLE

The Precautionary Principle is set out as Principle 15 of the Rio Declaration. In interpreting this principle, Article 3 of the 1992 United Nations Framework Convention on Climate Change (UNFCCC) states the following: "The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address

climate change may be carried out cooperatively by interested Parties." Opinions vary as to how and at what stage the Precautionary Principle should be applied.

INTERNATIONAL AND NATIONAL SOLUTIONS

Aviation is a global industry and many of its impacts require global solutions. The International Civil Aviation Organization (ICAO) has a vital role to play in identifying the way forward and setting the framework at an international level for national and local implementation. It is important to consider both the national and international impact of proposed policies and to influence policy so as to minimize adoption of unilateral measures which could have adverse effects on the UK aviation industry and the national economy.

WELL DESIGNED POLICY MEASURES

Measures to address sustainability issues, including the external effects, must be:

- ▶ economically efficient - to achieve the desired result at least cost, through market measures, and minimise any wider economic impacts
- ▶ non-discriminatory - applied proportionately to other industries which have the same impact and in a way which does not affect the competitiveness of the UK relative to other countries
- ▶ technically feasible - the means for implementation should be available
- ▶ environmentally effective - meets agreed environmental requirements and avoids unintended environmental consequences
- ▶ socially inclusive - observing the right to social, economic, gender and cultural equality.

ADDRESSING TRADE-OFFS

It is inherent in management of overall environmental impact that, often, a measure designed to reduce one impact can have an adverse effect on another. Such interdependencies must be recognised, evaluated and taken into account. This can result in "trading-off" one against another. Illustrations of the need to address this principle include:

- ▶ technology measures to reduce noise at source can have a negative impact on fuel efficiency
- ▶ operational measures such as flying lower to avoid formation of cirrus cloud would lead to increased carbon dioxide (CO₂) production because of the reduced fuel efficiency at lower altitudes.

Externalities and potential economic instruments to address them:

Aviation in the UK is owned largely by the private sector, pays for its own infrastructure through airport and en-route charges, and contributes to the exchequer through corporation taxes and, in the UK, through Air Passenger Duty. Externalities, and the means to meet the sectors' external environmental costs, should be addressed and Sustainable Aviation provides a framework to do so. Externalities may be addressed through voluntary action or as a result of government intervention in the form of regulation, economic instruments (including trading and charges) or through voluntary agreements. Externalities can also be internalised by investment in and implementation of technology, or by increases in operating costs due to trade-offs. The introduction of any measure to address such costs should be clearly justified against the criteria identified above for well-designed policy measures.

The Aviation and the Environment - Using Economic Instruments report⁵ estimated the cost of climate impacts associated with UK passenger aircraft at £1.4 billion in 2000, rising to over £4 billion in 2030. Local air quality costs for all passengers at UK airports in 2000 were estimated in the range £119 - £236 million a year, while noise costs at all UK airports in 2000 were estimated at £25 million a year. There is a range of other environmental factors associated with aviation which are more difficult to quantify in monetary terms.

Different steps towards internalising aviation's external costs have been discussed for several years, against a background of the Chicago Convention which prohibits the imposition of taxes or charges on fuel kept on board aircraft and consumed on international flights. There are four main options regarding economic instruments.

- ▶ Trading schemes: such schemes involve the trading of "allowances" (in relation to emissions or other such adverse impacts) within a defined group of players, following an initial allocation. Emission reductions are ensured by a reducing total cap.
- ▶ Charges: these are levies that are designed and applied specifically to recover the costs of providing facilities and services for civil aviation. Where proposed to address externalities, these should involve use of revenues generated to mitigate the externality against which the charge is levied.
- ▶ Taxes: these are levies that are designed to raise national or local government revenues which are used for general government spending; in the UK, Air Passenger Duty raises nearly £1 billion per annum.
- ▶ Financial penalties: imposed for example, by airports on airlines not meeting departure noise standards.

6. Working with government

Aviation, in view of its international nature, operates within a framework of controls at the global, national and local levels. Some of the goals identified as part of this strategy assume changes that can only be effected by government.

Recommendations have been identified for government consideration and are identified in the text. Four of these are relevant to several goals, and are set out as follows.

- ▶ Continue to work, through ICAO and other relevant international organisations, to define solutions at an international level.
- ▶ Continue to take a leading role in ensuring the delivery of the National Aerospace Technology Strategy through the coordination of government resources identified in the Aerospace Innovation and Growth Team (AeIGT) Implementation Report⁶ and ensuring funding mechanisms are available to enable manufacturers to maintain the drive towards technological and operational targets.
- ▶ Encourage and facilitate studies on technical and economic impacts, and on trade-offs, aimed at meeting environmental targets, in association with academic studies on the environmental impacts of aviation.
- ▶ This joint approach should also include active support for an internationally connected vehicle to link research in this area through networking and knowledge transfer.

This strategy represents the voluntary first step by all sectors in the UK aviation industry towards building a shared long term approach to sustainable development.

Goals and commitments

This section outlines the major sustainable development issues faced by the industry as a whole, identifying common goals to which each endorsing company will contribute according to its own respective role. For each of these goals, specific commitments have been identified setting out how each goal will be reached, along with indicators related to the individual goals. It is recognised that more work will be required to develop the indicators in future iterations of the strategy.

1. Implementation and communication

THE ISSUE

The successful implementation of Sustainable Aviation is essential if the UK aviation industry is to fulfil its sustainable development objectives. The broad coalition of industry partners in the UK and abroad represents a wide range of environmental and corporate responsibility priorities, and current progress towards the Sustainable Aviation goals varies considerably. In addition, the level of industry understanding of sustainability issues, and the way such issues are communicated to other stakeholders, requires more effective two-way communication. In this respect the development, monitoring and review of Sustainable Aviation is fundamental to the success of the strategy.

PROGRESS TO DATE

A number of UK aviation organisations are already acknowledged leaders in establishing corporate responsibility programmes and communicating on a wide range of related issues.

Many major aviation companies have carbon management programmes, and have established clear environmental management systems, for instance in accordance with ISO14001. UK aviation companies and trade associations have taken a proactive role in discussions concerning participation of aviation in the European Union Emissions Trading Scheme (EU ETS). Airports and airlines have pioneered stakeholder liaison through consultative committees, which have been helpful in resolving disagreements over aviation development.

The Goal:

Full industry commitment to sustainable development, and a broader understanding of the role of aviation in a sustainable society.

Indicator

The list of companies/organisations that have endorsed the strategy

Commitment 1

Progressively strengthen the Sustainable Aviation goals, and encourage all aviation companies to endorse the strategy and participate in its delivery.

Discussion

It is implicit in the goal to achieve comprehensive endorsement. It was particularly important that the major companies in each sector would feel able to own the strategy. However, the different priorities and requirements of each sector have inevitably led to compromises on some issues. Additionally, as the strategy developed it became clear that progress in some areas would be hampered by a lack of information, as well as other factors (such as political negotiations) that were beyond the control of the industry.

In order to balance these concerns it was established that Sustainable Aviation would become an iterative process, much along the lines of the sustainable development strategies of other industries. Sustainable Aviation would establish the principles of industry coordination on sustainable development issues, and would seek to strengthen both the strategy commitments themselves, and the extent of UK aviation's participation. Working towards a vision of sustainability for 2030 and beyond, the Sustainable Aviation process will seek to broaden the ownership and deepen the scope of the commitments.

Commitment 2

Report formally and publicly on progress towards the Sustainable Aviation goals and commitments every two years, with the first review in the autumn of 2006.

Discussion

Sustainable Aviation provides an overall framework, setting the key strategies for the industry whilst enabling the individual sectors to manage strategy development and implementation. This sustainability strategy represents the beginning of an iterative process. Due to the particularly complex interaction between so many different organisations, Sustainable Aviation participants have elected, at this stage, to report every two years. It is expected that the first review will be published in late 2006, and every 24 months thereafter.

Commitment 3

A Sustainable Aviation Governance Framework, to facilitate progress towards achieving the strategy's goals.

Discussion

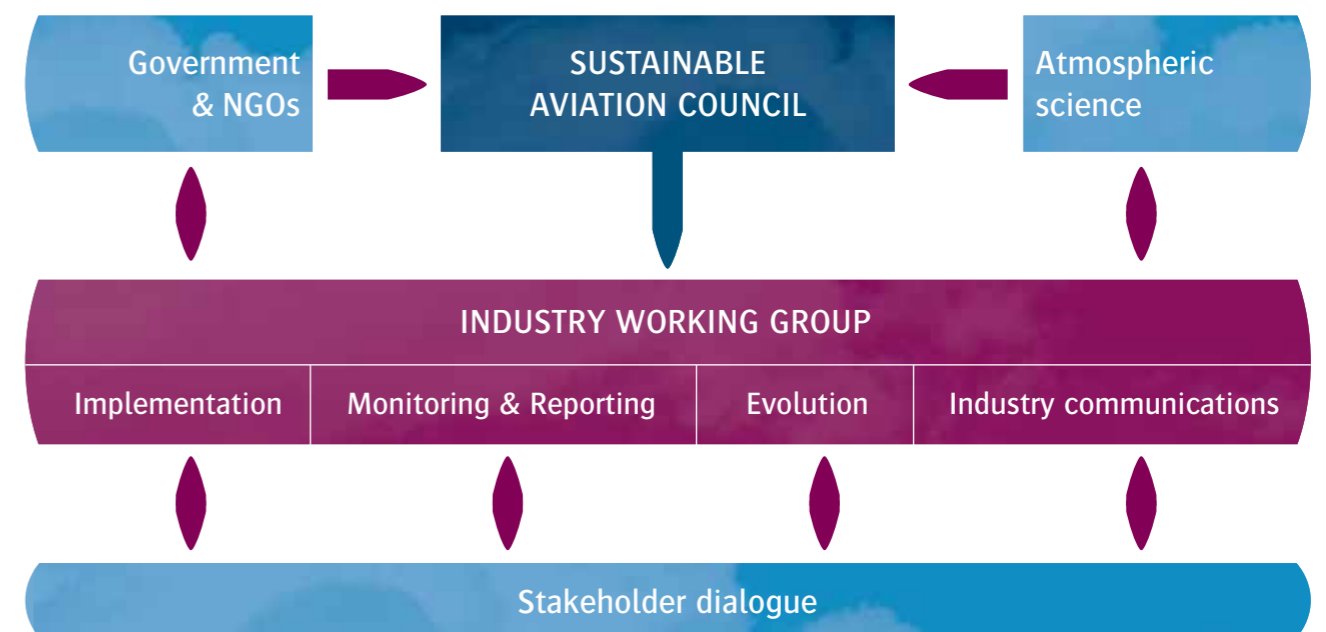
One of the key responsibilities will be to establish the criteria for continued Sustainable Aviation membership, i.e. to demonstrate active progress towards delivering the strategy commitments.

This commitment provides for a governance framework, which will provide for stewardship and implementation of the strategy. It will include membership across all the aviation industry sectors, with representation of all Sustainable Aviation signatories. A Steering Group will oversee the reporting by each appropriate Sustainable Aviation signatory or body on its respective commitments. An industry council will lead the biennial Sustainable Aviation review process.

It will be the task of the Steering Group to ensure that signatories are aware of their responsibilities and obligations regarding the strategy, and to ensure that the commitments and goals remain relevant to the sustainable development objectives of the aviation industry.

The resources and organisation agreed to ensure the governance of Sustainable Aviation will also be used to promote the widest review of all aviation environmental matters between the Industry and government and, with

Sustainable Aviation Governance Concept



agreement on a case by case basis, coordinate or manage specific joint projects in pursuit of the Sustainable Aviation goals.

Commitment 4

UK aviation companies will develop, implement and encourage best practice among industry partners across sustainable development issues.

Discussion

Many UK aviation companies are world leaders in sustainable development in their respective industry sectors. However the diverse nature of the industry, and its internationally connected nature, necessarily leads to a fragmented and inconsistent response to sustainability issues. Wherever possible, the Sustainable Aviation process will seek to identify examples of leadership in areas that contribute to the strategy's goals, and encourage those companies to share that best practice with their fellow signatories.

Sustainable Aviation is very much a foundation on which to build. Many leading companies in the industry already go further in their own policies than is reflected in the commitments. Sustainable Aviation provides a vehicle to share that best practice more widely throughout the industry and over time will aim to raise performance in the sector as a whole towards that of leading companies.

All the commitments in this strategy are designed to encourage best practice, and the ongoing Sustainable Aviation process allows for regular industry coordination towards achieving the strategy's goals. In addition, signatories are committed to work proactively at an international level, to develop solutions to aviation environment issues, through such bodies as ICAO and the European Union (EU).

Commitment 5

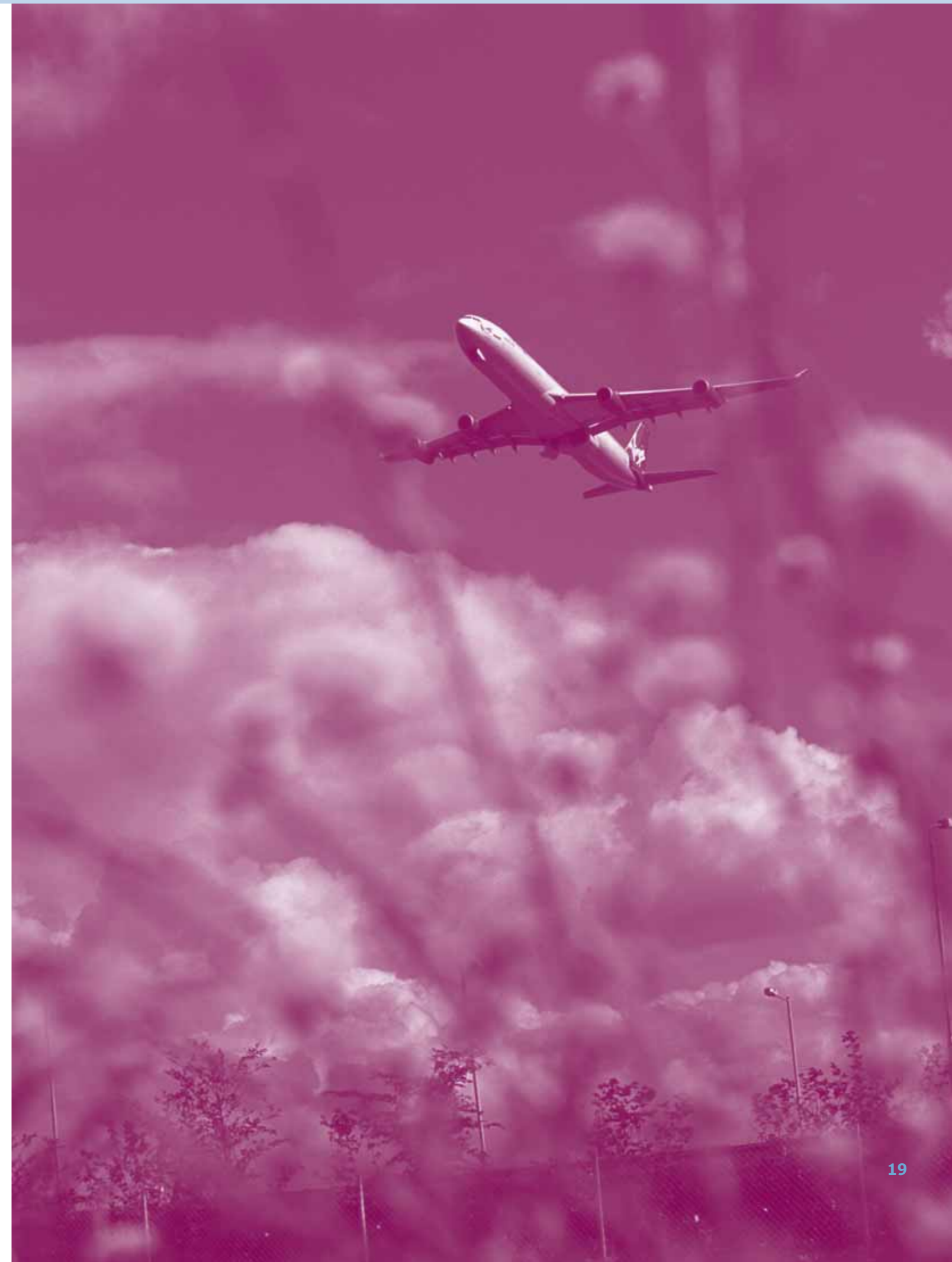
Provide the means for communication on issues related to aviation and sustainable development, including stakeholder dialogue, through the ongoing Sustainable Aviation process.

Discussion

It is incumbent on the industry to provide the opportunity for stakeholders at the local, regional and national level to state their position as this strategy develops. In some areas there are conflicting social, economic and environmental objectives to be met. There is frequent reference in the press to aviation and its impact on the environment, with varying degrees of accuracy. The industry is committed to make efforts to enhance effective dialogue on sustainable development issues.

One way forward is more effective stakeholder dialogue at the national level (complementing local stakeholder engagement), seeking to explore differences, deepen the understanding of all parties, and identify solutions that are in the interest of all stakeholders. It is anticipated that this dialogue will develop through the Sustainable Aviation process, for example through representation in the governance framework.

It is also important that the industry communicates its position on sustainable development issues to its shareholders, customers, suppliers and employees.



2. Climate change

THE ISSUE

Climate change is one of the most important challenges facing humanity in the 21st Century. The long term goal of policymakers is to achieve stabilisation of greenhouse gas concentrations at a level that will prevent dangerous man-made interference with the climate system. The aviation industry supports that goal and is committed to limit aviation's contribution.

Aircraft operations generate CO₂, a direct greenhouse gas, and lead to other effects in the atmosphere linked to ozone generation, methane reduction and cirrus cloud formation. Current estimates suggest that up to a 70% reduction in greenhouse gas emissions will be required from all sources by 2050 to stabilise greenhouse gas concentrations in the atmosphere. Emissions from aviation are forecast to grow and contributing to the UK reduction target will present a major challenge. Technological and operational improvements will play a part, but additional measures will be required. Against this background, the industry is actively engaged in determining effective measures to limit aviation's climate impacts. Aviation has invested consistently in clean technology through the development and acquisition of newer aircraft which emit less noise, use less fuel and emit less of polluting exhaust gases. Despite improvements in management practices and in technology, the growth in commercial aviation has led to a situation where some impacts are growing, exacerbating the long term environmental impact of commercial air transport.

PROGRESS TO DATE

Reducing aircraft fuel consumption remains a key business objective for airlines and aircraft manufacturers. Aircraft fuel efficiency has improved by some 70% over the last 40 years and is expected to increase at a rate of around 1-2% per year for some time to come. British Airways has reported fuel efficiency for a number of years and such reporting will be extended to other airlines (see Commitment 11).

ACARE

Technology developments can do much to address environmental effects and the following research goals have been established for the aerospace industry by the Advisory Council for Aeronautical Research in Europe (ACARE):

- ▶ *to reduce fuel consumption and CO₂ emissions by 50%*
- ▶ *to reduce perceived external noise by 50%*
- ▶ *to reduce NO_x by 80%*
- ▶ *to make substantial progress in reducing the environmental impact of the manufacture, maintenance and disposal of aircraft and related products.*

A formal UK industry review will be carried out in 2008 and 2012 of progress towards achievement of these goals to inform, and redirect as appropriate, actions needed at the European level to ensure delivery of the goals.

These are generic goals. From a review of the ACARE document and further review by industry experts, the Sustainable Aviation Steering Committee concluded that the first three ACARE goals could be interpreted as applying to aircraft entering service in 2020, using then current operating procedures, relative to new aircraft entering service using current operating procedures in 2000. Progress towards these targets would include contributions from operational improvements, including those in air traffic management.

Tim Johnson, Director, Aviation Environment Federation

"The pace and scale of growth in the aviation sector presents major environmental challenges that conflict with society's need to reduce emissions and noise from all sectors to considerably below today's levels. Issues surrounding scientific understanding should not prevent early action to include aviation in a comprehensive and effective environmental framework to meet these objectives."

The Goal:

Aviation incorporated into a global policy framework that achieves stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man-made interference with the climate system.

Indicators

Total direct CO₂ emissions arising from individual companies.

Aggregated and individual airline CO₂ emissions per Revenue Tonne-Kilometre (RTK).

Progress towards ACARE fuel efficiency target for new aircraft relative to 2000.

The long term goal of policymakers is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous man-made interference with the climate system. We fully support that goal. This will require a global solution covering all major sources of greenhouse gases. In order for aviation to contribute to this goal, international air transport should be incorporated into the global policy framework through ICAO and other relevant United Nations bodies by 2012.

This goal will take time to achieve and we recognise the need for a flexible approach that reflects the differing regional pressures that exist for climate change action. However, aviation is a globally competitive business and is governed by international agreements and regulations. Any regional policies must therefore be developed with reference to the direction of work within ICAO and other relevant bodies, taking account of the specific characteristics of aviation.

UK targets for overall CO₂ reductions of 12.5%, by 2010 relative to 1990, have been set through the Kyoto Protocol. The UK Government has set longer term targets for 2020 and 2050, and has also projected that emissions from aircraft will grow⁷. The UK aviation industry accepts that growth is an issue and is committed to play its full part in meeting internationally agreed targets alongside other industries. Aviation will remain dependent for the foreseeable future on fossil fuel. As such, there is a powerful case for aviation to take up some of the earth's capacity to absorb greenhouse gases, after key human development needs such as clean water, food, and sanitation (in both developed and developing countries) have been met. Importantly, this would only be permissible by aviation minimising its impacts through technology and operational improvements, and meeting the external costs of its remaining emissions. Discussion has centred on emissions trading, as the policy likely to yield most environmental benefit at least cost.

Aircraft operations contribute to climate change through emission of CO₂ and other effects on the atmosphere (see box above). No single measure is likely to address all of these effects. Specific measures will be necessary for the specific impacts. Such measures will also need to be introduced over different timescales, to allow the necessary research to take place into basic atmospheric processes as well as into the specific impacts of aviation. This will then allow the proper evaluation and identification of the most appropriate policy solutions for aviation.

We therefore support an approach that:

- ▶ establishes an objective shared by industry and government of addressing all of aviation's climate change effects
- ▶ sets out clear milestones towards delivering that objective, developed by cross-sectoral consensus in collaboration with government, the scientific community and other stakeholders.

Commitment 6

Airline and airport signatories to build support and assist policymakers in developing practical solutions for inclusion of aircraft CO₂ emissions in the EU Emissions Trading Scheme by 2008, or as soon as possible thereafter, as a first step towards a global approach.

Commitment 7

Take a proactive role towards securing a positive engagement from the international aviation community to support measures to address climate impacts.

Discussion

ICAO States have endorsed the development of an open emissions trading system for international aviation, noting that analyses of such a system have shown it to be a cost-effective measure to limit or reduce CO₂ emitted by civil aviation. Whilst an international approach through ICAO must be the ultimate objective, linking aviation with the EU ETS would be a significant step towards this objective. Trading schemes such as the EU ETS involve an overall limit or cap on emissions to achieve an environmental objective. Some sources may be able to increase emissions provided that others reduce by more than equivalent amounts. Individual targets may be set within such schemes. Some UK aviation companies are already involved in the EU ETS through their ground installations. Incorporation of air transport in such an international scheme would represent a radical change in the management of the environmental impacts of aviation.

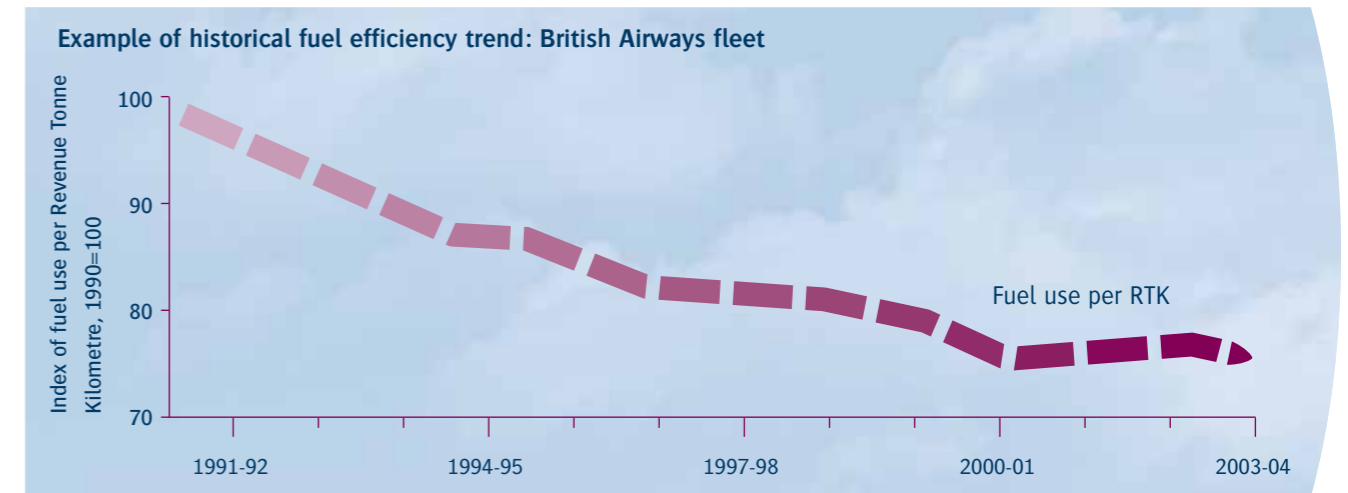
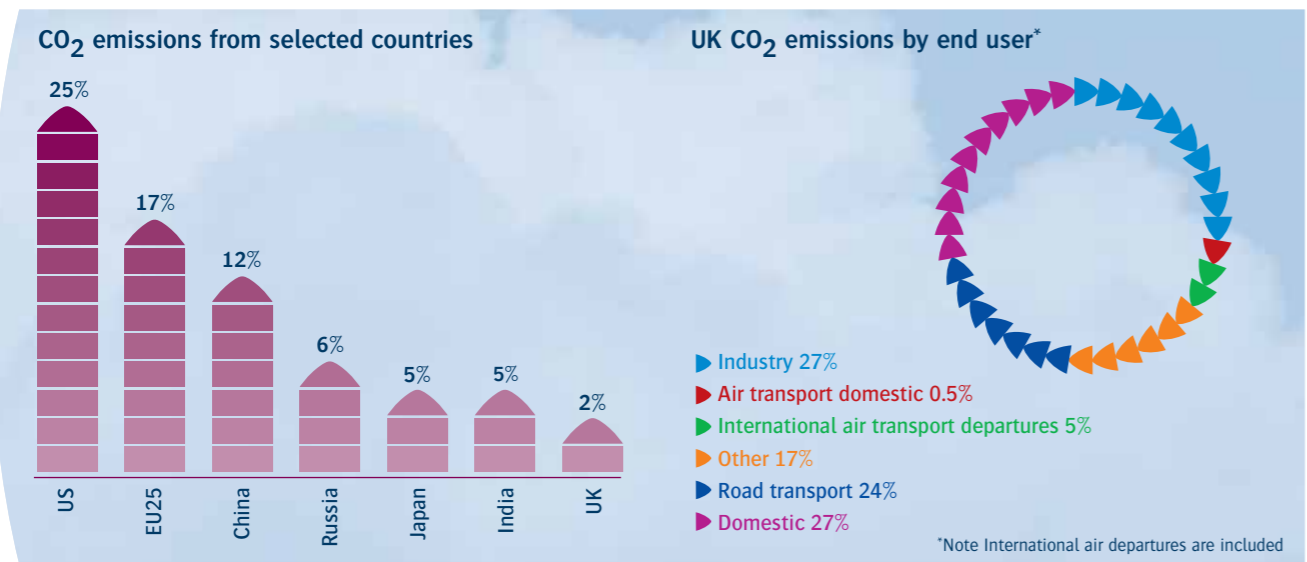
A number of issues must be resolved if emissions trading is to be a practical proposition for aviation. UK airlines and airports will work with stakeholders to develop practical

solutions for inclusion of aircraft CO₂ emissions in the EU ETS by 2008, or as soon as possible thereafter, as a first step towards a global approach. The industry believes that taxes or charges are unlikely to be effective measures to limit aviation's contribution to climate change impacts.

In line with the Kyoto Protocol and the greenhouse gases defined therein, the initial focus of attention should be on CO₂, since its effects are much better understood scientifically and are longer-lasting compared with the impacts of other emissions such as NO_x.

The UK aviation industry is committed to the ICAO and United Nations Framework Convention on Climate Change (UNFCCC) processes to resolve practical issues at the international level, including agreeing a unified allocation methodology for aircraft emissions that maintains the global competitiveness of the industry by ensuring consistent treatment of aviation across States. The UK aviation industry will work with government to identify allocation options.

The use of other economic instruments to address aviation's climate impacts has been debated. Analyses by ICAO's Committee for Aviation Environmental Protection and the EU indicate that the use of taxes or charges could lead to negative social and economic effects with limited environmental benefit. There are examples in the aviation industry where the structure of charges has been used in a revenue-neutral way to support environmental objectives (for example charges). This is an option that should be kept under review as the non-CO₂ impacts of aviation become clearer. However, the UK industry remains of the view that emissions trading is the best economic instrument for dealing with the CO₂ effects of aviation.



Commitment 8

Provide relevant data and expertise for the scientific community to enhance understanding of the non-CO₂ atmospheric effects of aviation, and support improvements in metrics for quantifying and reporting effects.

Commitment 9

Propose appropriate mechanisms by 2012 for mitigating non-CO₂ effects based on a consensus of scientific understanding.

Discussion: work with the scientific community

There is wide agreement that further research is necessary in order to understand fully the impacts that aviation's contrails, particle emissions and NO_x emissions have on climate. This research is taking place, and we are committed to offer further support to such research. For example, British Airways and Airbus are involved in a major European research project (Integration of routine Aircraft measurements into a Global Observing System, IAGOS), to measure directly non-CO₂ aviation effects in the atmosphere. This project is one of several aiming to bring much needed improvements in the scientific knowledge of these atmospheric processes.

The industry supports, and will actively participate in, the development of a knowledge transfer network involving

the research councils, universities, government departments and the aviation industry to enable full linkage of academic research with industry. However, industry alone cannot ensure that this research is adequately supported, and we shall continue to work closely with the UK Government in order to ensure that this research is given appropriate priority and funding.

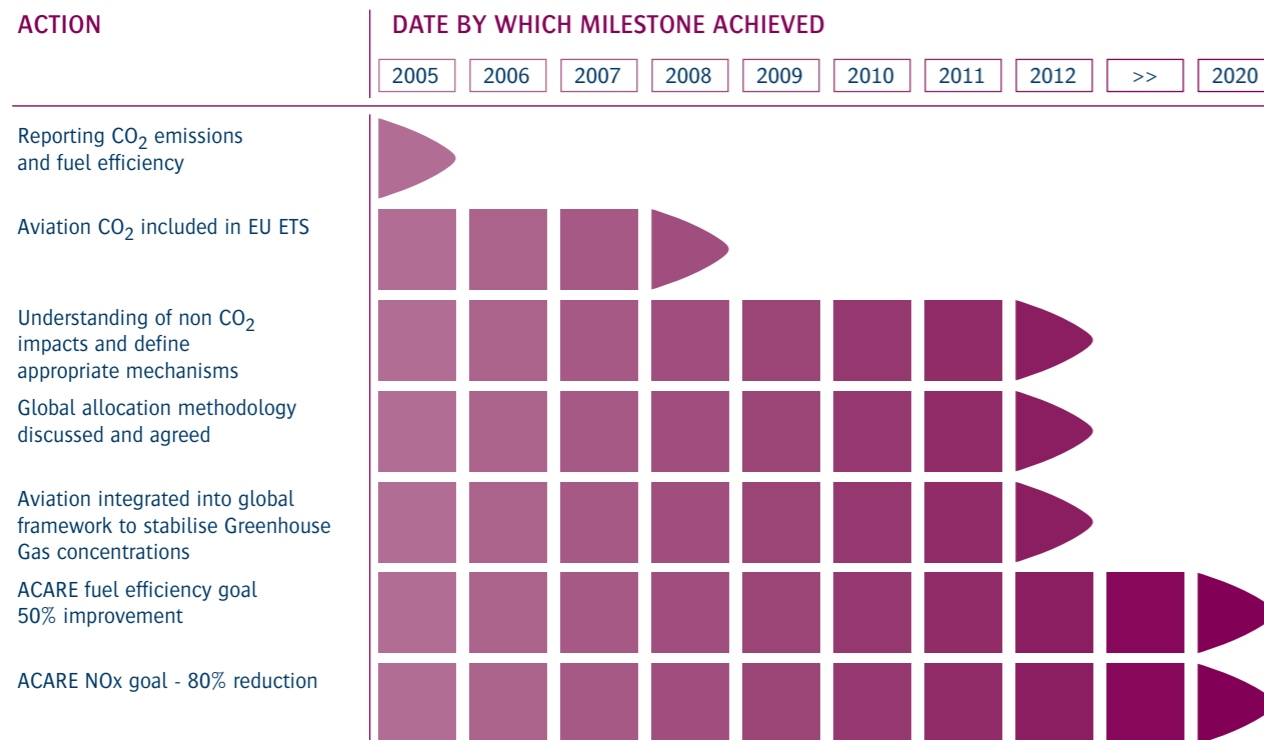
Discussion: metrics

The Kyoto Protocol identifies a basket of 6 greenhouse gases, that have long lifetimes in the atmosphere, and uses Global Warming Potential (GWP) to define effects on a comparable basis. Shorter-term climate effects such as the effects of ozone and contrails are not well characterised by GWP and they are currently represented by a metric called radiative forcing.

Radiative forcing is considered useful for comparing very different forcing mechanisms, although there is debate over the appropriateness of adding up best estimates of radiative forcing to determine global temperature response. Industry will support the scientific community and other stakeholders in improving the metrics used to compare and report the non-CO₂ effects of aircraft.

Discussion: mechanisms for mitigating non-CO₂

Without the required level of scientific knowledge on the non-CO₂ climate impacts of aviation, it is not possible at this stage to define appropriate mechanisms for addressing these impacts. Scientific uncertainty is not, however, a



reason for inaction and we must seek the most appropriate ways to address all of these impacts. Some of the areas where real progress can be made are illustrated below.

Technology will play an important role in mitigating the effects associated with NO_x at cruise. Strenuous efforts have been made through technological improvements to limit the contribution of aircraft NO_x to the local air quality burden around airports. The industry expects to make further improvements with each new generation of aircraft and engine design in line with the ACARE target for new aircraft in 2020 to emit 80% less NO_x relative to comparable new aircraft in 2000. This will also have a benefit in reducing NO_x emissions at cruise.

In terms of standards, ICAO has recently increased the stringency of certification standards for Landing and Take-Off cycle NO_x emissions. Industry will continue to work proactively through ICAO to secure tightening of standards and to further develop technological goals to reduce the impact of NO_x emissions.

A recent meeting of scientists in the UK concluded, inter alia, that:

"research efforts need to focus on two aspects: better and more robust quantification of impacts of aviation and the possibilities that improved technologies (engine, airframe, operational) might offer through analysis of environmental impacts as a combined technology/science programme" - Thorpe et al (2005)⁸.

In relation to both NO_x, and cirrus cloud effects, it could be feasible in the long term to limit the impacts through advanced air traffic management by changing aircraft routes. For example, at a European level, EUROCONTROL is currently conducting a joint project with the European Space Agency to assess the feasibility of a system to predict contrails and cirrus, and then to explore possible mitigation measures. As understanding of this issue develops, the air navigation service providers and airlines could participate in testing relevant operational procedures.

However, we acknowledge that this remains a complex area with many uncertainties. In addition, premature action aimed at limiting or reducing the impacts of short-term NO_x-induced ozone and contrail/cirrus arising from aviation could have a perverse impact on other policy objectives, for example by increasing emissions of CO₂.

Given that the life of CO₂ is significantly longer than cirrus clouds and NO_x-induced ozone, more robust understanding of trade-offs between these effects is needed before any policy mechanisms can be evaluated.

How does aviation contribute to climate change?

The Intergovernmental Panel on Climate Change (IPCC) has estimated that aviation accounted for around 3.5% of man's contribution to global warming in 1992⁹. IPCC estimated that aviation emissions could grow to 4-15%, with a central estimate of 5%, of the global total by 2050.

Commitment 10

Continual improvement in technology and air traffic management towards the ACARE emission targets.

- ▶ Improve fuel efficiency by 50% per seat kilometre including up to 10% from ATM system efficiencies.
- ▶ Reduce NO_x emissions by 80%.
- ▶ By 2020 based on new aircraft of 2020 relative to equivalent new aircraft in 2000.

Discussion

For CO₂, the target is a 50% cut in CO₂ emissions per seat kilometre, which means a 50% cut in fuel consumption in the new aircraft of 2020 relative to new aircraft in 2000. The overall target of 50% reduction will be addressed through airframe, engine and air traffic management improvements. The role of an optimised air traffic management system is substantial with a target contribution of 5-10% lower fuel consumption through reductions in in flight delays, route inefficiencies and taxiing times.

For NO_x, the ACARE target is an 80% cut in NO_x emissions in new aircraft of 2020 relative to new aircraft in 2000, to be achieved largely through aircraft and engine improvements. Combined with the 50% reduction

in fuel consumption, a 60% reduction of the combustor NO_x will give an approximate 80% reduction of total NO_x produced at cruise altitudes.

Commitment 11

Develop and implement common reporting of total CO₂ emissions and fleet fuel efficiency by airline by end 2005.

Discussion

Companies will calculate and report total direct CO₂ emissions generated by their business operations annually. Development of a common reporting methodology will ensure reporting consistency.

Airlines will report fuel efficiency using a common reporting methodology, using a metric such as grams of fuel per revenue tonne kilometre. BATA will aggregate this data and report the fuel efficiency of all participating airlines on an annual basis.

UK aviation industry leaders have already implemented such reporting and continue to influence the extent and quality of reporting in the wider international aviation community. Other emissions can be reported, but the relevance of such data, such as overall NO_x emissions, to climate impacts is not yet clear.

Commitment 12

Inform passenger understanding of the climate impacts of air travel, including evaluating carbon offset initiatives as a practical short-term measure. Provide an update by the end of 2006.

Discussion

The most effective ways to address aviation's greenhouse gas emissions will be to reduce them at source through technology improvements and to incorporate aviation in the global policy framework to stabilise concentrations of greenhouse gases in the atmosphere. However, technology and international policy solutions will take time to deliver.

CLIMATE EFFECT	NATURE OF IMPACT	SCIENTIFIC UNDERSTANDING
CO ₂ generation	Has the same impact wherever it is emitted and lasts in the atmosphere for about 100 years, although the effect is longer because of climate inertia. The effect is global.	"Good" ¹⁰ . There is widespread acceptance that research has provided a robust understanding of the scale and climate impacts of aviation-related CO ₂ .
Tropospheric ozone generation	Emissions of oxides of nitrogen (NOx) during cruise generate tropospheric ozone (climate warming). The lifetime of ozone is weeks although the effect is longer because of climate inertia. These effects are regional rather than global. The extent of the ozone effect also depends on altitude, location and atmospheric conditions.	"Fair" ¹⁰ There is uncertainty over the extent of the impact. The IPCC notes that changes in tropospheric ozone are mainly in the Northern Hemisphere, while those of methane are global in extent. Given this, the net regional radiative effects do not cancel.
Methane reduction	Emissions of oxides of nitrogen (NOx) during cruise result in the reduction of ambient levels of methane (from other sources) in the atmosphere, which results in cooling. The lifetime is around 8-12 years although the effect is longer because of climate inertia. The effects are global.	
Contrails and cirrus cloud formation	Contrails only form in very cold, humid atmospheres. Ambient temperature and the level of ice-supersaturation regulate the lifetime of a contrail, which may vary from seconds to hours. Contrails may in turn lead to the formation of cirrus clouds. The effects are highly dependent on altitude, location and atmospheric conditions. The extent of enhanced cirrus that arises from aircraft contrails and particle emissions is not well quantified, although there is some evidence of a correlation between cirrus trends and air traffic.	"Fair" for contrails, but "poor" for cirrus ¹⁰ . Generally, the role of clouds, including cirrus, in climate change is one of the least well understood areas.

Voluntary offset schemes aimed at airline customers may be able to contribute as an interim measure. These involve passengers or companies paying to offset the CO₂ emissions from their flights. UK airlines recognise the potential role of carbon offsets and several are actively exploring such schemes. We are committed to exploring this issue further and to promoting such schemes, if appropriate.

RECOMMENDATIONS TO GOVERNMENT

- Commission research and promote collaboration with the scientific community into the non-CO₂ effects of aviation through raising the priority of this work, providing guidance on prioritisation and ensuring sufficient funding. This should include active support for a knowledge transfer network to link research in this area.
- Agreement should be sought through the UNFCCC, on an allocation methodology for international aircraft emissions that reflects the global competitiveness of the industry, the need for consistency across states and the goal of integrating aviation into the global approach to address climate change by 2012.

- Work with the scientific community and industry to develop sufficient understanding of aviation's non-CO₂ climate effects to define which policy approaches, technological, regulatory, voluntary or economic, are appropriate, by 2012.
- Encourage the UK Airspace Regulator to design a streamlined process for implementing airspace changes, for example where there are potential environmental benefits, reducing current average request to approval timescales significantly. This streamlined procedure should be in place by end 2006.



3. Noise

THE ISSUE

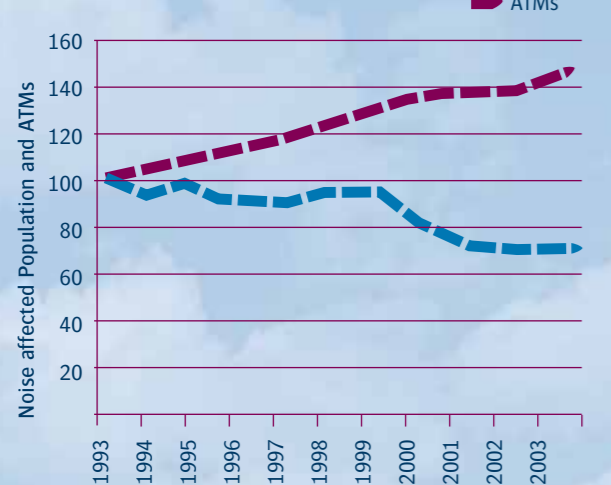
Historically, noise has been the external impact of aviation with the highest profile. There have been substantial reductions in the noise generated by new aircraft and in the overall noise at many airports. However, at most airports, the frequency and total number of movements is expected to increase in the future. For some people near airports, aircraft noise is a significant nuisance affecting their quality of life. There is considerable variation in individual reactions. Aircraft noise can also have impacts on sleep.

PROGRESS TO DATE

Balanced Approach:

The ongoing importance of noise has been recognised in the introduction of the ICAO "Balanced Approach". This involves the use of a cost effective balance of four key elements: reduction at source; operational improvements; land use planning; and operational restrictions. This is embedded in European legislative requirements and is now central to strategy for addressing noise issues.

Index of noise affected population* and air transport movements 1993=100



* At the following 6 airports: Heathrow, Gatwick, Stansted, Manchester, Birmingham & Luton

Night noise:

Noise emitted at night is of particular concern and the industry, government and society must seek to balance disturbance, the constraints on international schedules, and the best use of available aviation capacity. Many airports already produce night noise contours and this will be reinforced by the requirements of the EU Directive 2002/49/EC effective from 2007.

Significant progress has been achieved in reducing the noise impact around many airports, arising from reductions in both engine and airframe noise as well as improvements in operational procedures. Today's aircraft are typically 75% quieter than jets in the 1960s¹¹. For example the number of people living within the area of 'onset of significant community annoyance' at Heathrow has dropped by over 80% in the last 30 years¹², during which time there has been an approximate fourfold increase in passenger throughput. Despite this, aircraft noise remains a highly contentious issue among communities around airports. In addition to this, recent improvements in noise may be negated by airport expansion and inappropriate land use planning.

ICAO:

The most significant control of aircraft noise is exerted through ICAO's recommended noise stringency levels ("Chapters") for noise from new aircraft which are implemented by most leading aviation nations. A range of noise reduction methods has been developed through ICAO and by airports, airlines, manufacturers and air navigation service providers to balance the economic and environmental impacts of noise disturbance. Policies in widespread use include noise caps and contours, noise budget restrictions, partial curfews, controls on engine running and differential noise charges. It is not only the noise of individual movements that has an impact, but also the frequency of movements.

The Goal:

Limit and, where possible, reduce the number of people affected by aircraft noise in the UK.

Indicators

The area enclosed by and the number of people living within the 57 dBA 16 hour LEQ contour at individual airports.

% achievement of Continuous Descent Approaches (CDA) at individual airports.

Progress towards the ACARE target for new aircraft relative to 2000.

Performance of the UK fleet relative to ICAO Chapter 4 standard.

REDUCTION AT SOURCE

Commitment 13

Continual improvements in technology and operations towards the ACARE goal of 50% reduction in perceived external noise.

- By 2020 based on new aircraft of 2020 relative to equivalent new aircraft in 2000.

Discussion

This commitment is essentially a drive towards the objectives of ACARE (see box on page 20). However, it should be noted that, while ACARE identified technology as the major source of improvements, both operational procedures and air traffic management are expected to contribute to achievement of this target.

LAND USE

Commitment 14

Where appropriate and not already in place, plans for property-related mitigation initiatives to be completed by 2007.

Discussion

While reductions in aircraft noise will continue through technological advances which reduce noise at source, operational improvements, further stringency in noise standards and greater emphasis on property-related initiatives should help to limit the number of people affected¹³. Airports and airlines have expressed concern about the encroachment of noise-sensitive development such as houses and schools on land close to airports and under flightpaths where noise is an important factor. Government has a critical role to play in the wider introduction of mechanisms such as planning controls. Such measures can have an impact upon the number of people affected by noise and also have the advantage of not involving trade-offs with greenhouse gas emissions.

OPERATIONAL PROCEDURES

Commitment 15

Develop and promote low-noise flight procedures through evaluation of future operational methods and implementation of best practice, for example:

- evaluate implementation of steeper and curved approaches for noise abatement at relevant airports
- complete a CDA outreach programme at all main UK airports by end 2006
- assess the feasibility of a best practice guide for environmentally optimum departure procedures, balancing both noise and local air quality requirements, by end 2006.

¹¹ ATWP, The Future of Air Transport, 2003.

¹² The UK Government considers a level of 57dB (Leq) to be the 'onset of significant community annoyance'.

¹³ ATWP, The Future of Air Transport, 2003.

Discussion: Future methods

As one of the four elements of the balanced approach, flight operational improvements have been recognised as an important means to reduce aircraft noise around airports. Operational procedures to reduce aircraft noise have been developed and refined over a long period of time. Advances in aircraft and air traffic navigation technology allow for research and evaluation of new operational methods to reduce further noise from individual aircraft.

Sustainable Aviation signatories will evaluate the benefits of, and the means to implement, techniques such as steeper approach angles and curved approach paths as potential methods for significantly reducing the impact of noise from individual aircraft approaching airports. Implementation of procedures of this type would represent a major change in the operation and management of aircraft in the approach phase, and the evaluation will require significant input from all sectors of the industry.

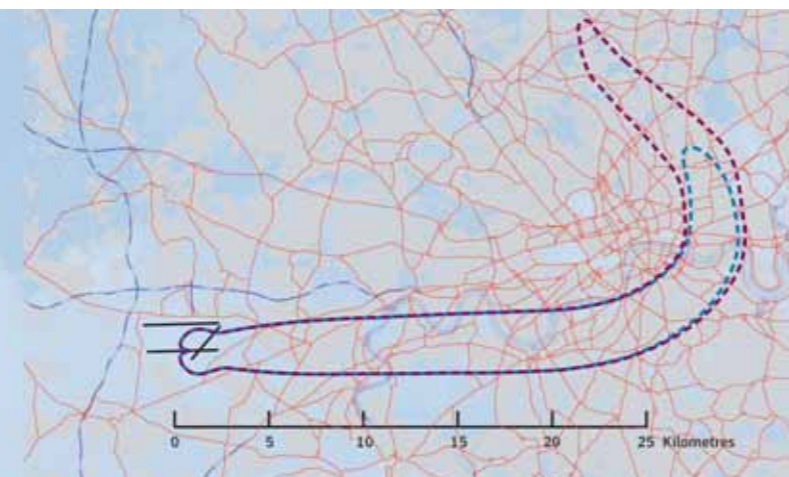
A number of operational trials are already underway, led by NATS, to assess the use of advanced navigational systems (aircraft precision area navigation, PRNAV) to reduce noise, emissions, as well as pilot and air traffic control work load.

Continuous descent approach (CDA) is an operating procedure that enables aircraft to approach an airport in an environmentally considerate manner maintaining as much height as possible. This type of procedure can result in noise reductions of up to 5 decibels. CDAs also lead to reductions in emissions as well as improved passenger comfort.

Indicative 75 dBA arrival noise footprint, CDA vs. non-CDA

- CDA footprint
- non-CDA footprint

Source BAA, footprint prepared by CAA/ERCD



These trials are being evaluated for consistency of flight tracks over the ground and use of this technology to maximise the benefits of CDAs.

A best practice guide for minimising arrival noise was published in February 2002¹⁴ giving practical information to pilots, air traffic controllers, airport operators and regulators, focusing on the use of CDA. A review of the guide is underway and Sustainable Aviation signatories will work with government to implement the findings by the end of 2006.

The arrivals noise guide relates to Heathrow, Gatwick and Stansted airports, but was written in such a way that the concepts would be transferable to other airports. To help realise the environmental benefits of CDAs at as many UK airports as possible, a CDA outreach programme will be initiated, targeting airports with more than 50,000 movements annually. The programme will include briefs on the benefits and implementation issues, and where necessary and requested, technical assistance could be provided by Sustainable Aviation signatories on CDA design and implementation. It should be noted that this could require significant resources in terms of implementing relevant changes to airspace designs and procedures.

At airports where CDA techniques and procedures are already in place, these will be monitored and reported in terms of percentage of all arrivals achieving a CDA. UK operators are on the whole well aware of CDA techniques. Foreign operators are often less aware. Airport operators will work as appropriate to secure better overall airline CDA achievement.

Operational procedures can be used to manage noise from departing aircraft as well as from arriving aircraft; however, there is an important trade-off between operational procedures for managing noise and those for limiting local air quality NOx emissions. Sustainable Aviation signatories will assess the feasibility of developing a best practice guide to environmentally optimum departure procedures (using a process similar to that used for arrivals noise), balancing noise and local air quality requirements.

Some Sustainable Aviation signatories are actively exploring options for developing an independent rating scheme to benchmark UK airports against best practice in noise management and mitigation at world-wide airports.

OPERATIONAL RESTRICTIONS

Commitment 16

Support operating restrictions at particular airports, where these are shown to be proportionate and necessary, and less restrictive solutions are not available.

Discussion

ICAO Resolution 14/1 encourages states to "not apply operating restrictions as a first resort but only after consideration of the benefits to be gained from other elements of the balanced approach". The introduction of such restrictions should be developed and implemented on an airport-by-airport basis through discussion between the airport operator, airlines and local community representatives.

Operating restrictions refer to noise-related actions to limit or reduce access of civil aircraft to an airport. They include the possibility of restricting aircraft that are marginally compliant with ICAO standards at specific airports as well as partial restrictions according to time periods.

Commitment 17

Continue to engage with noise-affected communities and develop local airport noise communication programmes by 2007, tailored to the needs of those communities.

Discussion

The way that aircraft noise is described to local communities is vital in developing trust and understanding. In order to build this relationship, the industry must work with government, and with wider stakeholders, to build on existing structures and develop a credible, independent framework on which to base research and improve understanding of the community reactions to aircraft noise.

The development of noise communications strategies will need to consider reporting supplementary metrics, as appropriate, to improve information provided to communities, relating to both day and night noise. Each airport will require a locally tailored strategy that is responsive to local community needs, for example through working with established consultative groups.

From 2008, the percentage of Sustainable Aviation signatory airports with a strategy in place will be published to record progress towards this commitment. Once communication strategies have been defined, airports should then design reporting regimes appropriate to the supplementary metrics they have undertaken to produce. Consideration of communication strategies and supplementary metrics will seek to build on the work of the Government sponsored "Attitudes to Noise from Aviation Sources in England" (ANASE) project as appropriate.

Airport communication strategies should recognise that noise disturbance occurs at a variety of distances from airports and commit to find a way to adequately assess the extent of noise affected communities. Night-time noise is of particular community concern and specific indicators in relation to night noise will need to be developed. These may include the number of people within the 90 dBA single event footprint likely to be awakened, reporting the number of movements/type of aircraft/Quote Count category, or other specific night noise contours.

RECOMMENDATIONS TO GOVERNMENT

- The forthcoming revision of PPG24¹⁵ is an opportunity to establish a consistent policy of more rigorous examination of planning permission for new noise sensitive buildings within specific noise impact areas such as 57 Leq and to seek to protect areas where aircraft noise impact has been recently reduced.

4. Local air quality

THE ISSUE

There is concern that EU standards for the annual mean concentrations of nitrogen dioxide (NO₂, a component of NO_x) and, possibly, particulates (PM₁₀), will be breached at residential dwellings near some airports. The NO₂ burden in the vicinity of airports is comprised of contributions from aviation as well as from other sources, principally road traffic which is responsible for a substantial proportion of the emissions¹⁶. Significant road traffic is associated with airports, but the aviation industry clearly has a role in ensuring that local air quality standards are met. The 1996 Framework Directive on Ambient Air Quality and subsequent 'daughter' Directives set mandatory limits for a range of pollutants including NO₂ and particulates (PM₁₀). The limits for NO₂ are binding from 2010 and for PM₁₀ from 2005.

PROGRESS TO DATE

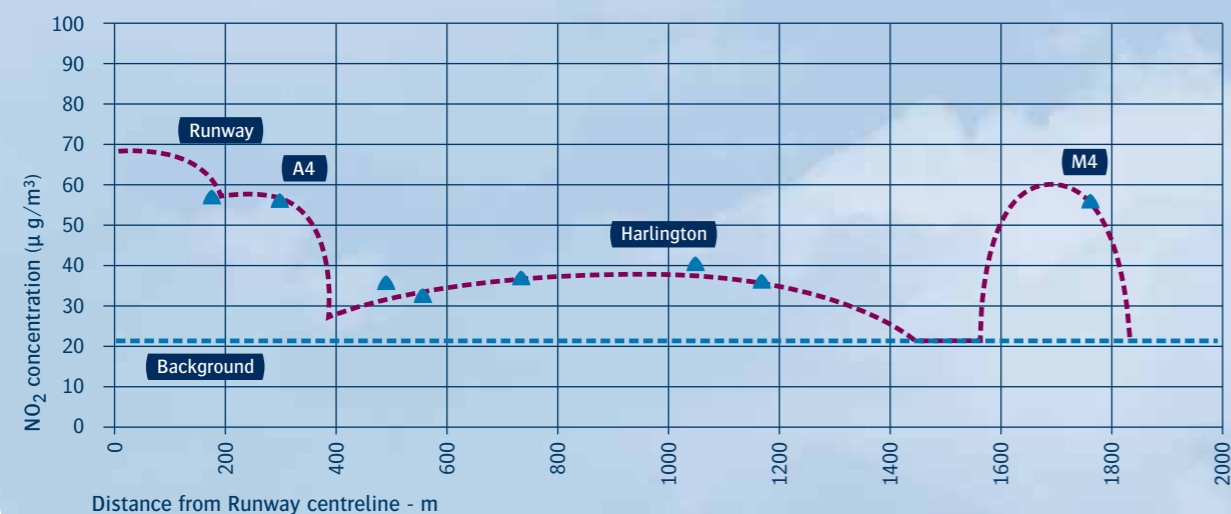
Since the 1960s emissions from individual aircraft of carbon monoxide and unburned hydrocarbons have been virtually eliminated through fleet replacement by aircraft with more modern engines.

ICAO has established a new, more stringent, NO_x standard, which will apply to all newly certified aircraft engines from 2008. Since many engines already achieve this standard it should reduce, on average, NO_x emissions from comparable aircraft types. Independently from this regulatory change, British Airways has retrofitted low-NO_x combustors to the Rolls-Royce engines on around half of its Boeing 747 fleet; the British Airways Boeing 777 fleet is also currently undergoing a retrofit of further improved NO_x technology to those aircraft with GE90 engines. This substantially reduces NO_x input into the local environment around airports where these aircraft operate. Other UK airlines have made a substantial investment in new, cleaner aircraft. For example, the average age of the Virgin Atlantic fleet is 5.5 years. The drive towards the ACARE target of 80% reduction in NO_x by 2020 is likely to lead to significant reduction in absolute NO_x emissions and in the aircraft contribution to local NO₂ concentrations in the future.

Measures are being taken within the aviation industry to reduce emissions from airport sources and, at some airports, to address road transport access, and associated emissions. At major airports there is widespread use of electrical ground power supplies, from airport terminals to aircraft, which helps to reduce emissions from auxiliary power units (APUs, small generators generally located in the rear of aircraft) during maintenance and during boarding and disembarkation of passengers. The industry has invested in rail access, for example the Heathrow Express, offsetting the increase in the number of people using cars to reach airports. At major airports many ground vehicles are powered by electricity. At Heathrow, where concern over air quality is greatest, a comprehensive air quality management plan has been introduced.

NO₂ monitoring in and around Heathrow

Annual average measured levels 2003-2004



The Goal:

Industry playing its full part in improving air quality and meeting air quality regulatory requirements at sensitive airport locations.

Indicators

Inventories of airport ground levels emissions of NO_x.

Annual mean concentrations of NO₂ at appropriate monitoring sites.

Commitment 18

Contribute to air quality measurement programmes and aid research to improve the assessment of aircraft and airport emissions to enable a better understanding, by 2007, of their actual contribution to local air quality close to airports.

Discussion

There is no indication that the short-term exposure limit (1 hour mean) for NO₂ (nitrogen dioxide), or either of the PM₁₀ limits are exceeded in communities around any airports in the UK. However, Department for Transport (DfT) modelling estimates have predicted that, for developments at Gatwick, and if a third runway were to be built at Heathrow by 2015, a significant number of people might be exposed to levels above the EU annual average limit for NO₂.

In the ATWP, the Government pointed to the consultation responses on this issue and to more detailed work that had been carried out to improve the modelling and to explore what scale of response would be required to reduce emissions from aviation as well as from other sources,

principally road traffic. The relative importance of the contribution from aircraft may well change significantly, with improvements in modelling and in the estimation of the aircraft contribution. Work is in hand within the "Project for the Sustainable Development of Heathrow"¹⁷ to define more accurately the contribution from aviation and other sources, and to assess and prioritise potential remedial actions. However, the trend at some major airports is for an increase in NO_x from aircraft.

It is therefore important to maintain focus on a range of measures that will limit the airport NO_x contribution to the local air quality burden.

To aid with the understanding of actual air quality, a significant number of measurements have already been carried out around some of the larger airports. Heathrow airport, in particular, has the highest concentration of continuous air quality monitors anywhere in Europe. These have been supplemented by numerous measurement campaigns using 'diffusion tubes'. Results for Heathrow are reported on the "Heathrowairwatch" website¹⁸. At other airports there are similar programmes, for example at Gatwick, Birmingham and Manchester airports¹⁹. These programmes are, variously, supported by airlines, airports and local and national government.

Commitment 19

Continual improvement in technology towards the ACARE target of an 80% reduction in NO_x emissions.

- By 2020 based on new aircraft of 2020 relative to equivalent new aircraft in 2000.

Commitment 20

Deliver continued improvements in airport ground vehicles, supply of ground power services, operational practice and the availability of cleaner fuels, in order to reduce NO_x emissions. Report on progress by end 2006.

Discussion

As mentioned elsewhere, targets have been set by ACARE for improvements in environmental parameters for aircraft engines, including NOx emissions. These will include a major element from new technology. Possible innovations include changes in the design of engine combustors to reduce NOx emissions. The greatest benefit will probably still remain in continuing to use take-off procedures that minimise NOx emissions. However these may involve trade-offs with noise impacts, and the effects will be evaluated at the same time as new noise requirements are being considered. It is likely that similar targets could be set for emissions from ground vehicles, but quantitative estimation is not possible at this time.

Benefits from other operational improvements will include reduced delays to aircraft queuing on the ground. The supply of Fixed Electrical Ground Power at the major airports in the UK has allowed some reductions in the running times of APUs. Further reductions to APU running times are possible at airports where Preconditioned Air is also available from the terminals.

Other improvements are possible through reducing emissions from vehicles and ground support equipment at the airport, including the wider use of low emission fuels, and reducing the number of vehicles bringing goods to the airport. While some airlines and airports already use a high proportion of vehicles using electricity or low emission fuels, there is still a trend towards vehicles with better emission performance. One approach to management could be through a “bubble” with an overall cap set on emissions. Within this concept, emissions from ground sources will show a steady decline relative to overall passenger throughput.

Commitment 21

Quantify trade-offs between NOx, noise and CO₂ emissions, so that these are taken into consideration by relevant regulators when setting future requirements.

Discussion

For arrivals, CDA procedures benefit noise, fuel burn and NOx emissions. Unfortunately, the same is rarely true for departure procedures. In the case of noise monitoring, for example, the positioning of noise monitors and setting of limits can be critical, as the requirement to increase power settings to meet noise limits will increase NOx production close to the ground.

Airlines currently use a “Reduced Thrust” technique for setting take-off thrust levels. This can have the effect of significantly reducing NOx emissions during the take-off run and initial climb, as well as reducing fuel burn and improving engine life. British Airways estimates that, for actual operations of their Boeing 747-400 aircraft, this would amount to approximately 30% less NOx produced relative to using full power. Changes in power used at take-off can affect noise under the flightpath.

It is imperative that these interdependencies are fully identified during consideration of environmental regulations so that a correct assessment of the adverse environmental effects, as well as the benefits, can be made.

RECOMMENDATIONS TO GOVERNMENT

- ▶ Action by government to complement initiatives from the aviation industry should be undertaken to address NOx issues on roads near airports.
- ▶ Pursue and develop an integrated framework, covering all sources affecting air quality at, and in the vicinity, of the airport. These should then be integrated within the Action Plans of the local councils, as required by the UK Air Quality Strategy.

Peter Bryant, Chairman, Gatwick Airport Consultative Committee

“Future growth and the need to balance benefits with environmental impacts will be debated more positively with local communities than hitherto. Air pollution and global warming will take centre stage. Noise reduction will have less impact with future gains being offset by increased traffic.

Unrestrained growth will continue to be challenged and irrespective of voluntary action, fiscal and regulatory measures to limit environmental impact will be expected.”



5. Surface access

THE ISSUE

Airports have developed, often as new focal points for transport, during a time when the car has been the dominant surface mode.

PROGRESS TO DATE

Despite significant efforts by many airports around the country, access continues to be dominated by the private car, giving rise to concerns over air quality impacts and nuisance to those living around airports.

The Goal:

Industry playing its full part in the development of an integrated transport system.

Indicators

Modal split for transport access by passengers at individual airports.

Modal split of transport used by staff at individual airports.

Commitment 22

To have completed, by 2007, establishment of surface access strategies for each airport and those companies located at airports, within Air Transport Forums, for staff, freight and passengers.

Discussion

Public transport, with emphasis on speed comfort and accessibility, includes direct coach and rail services to all major UK airports and an underground service to Heathrow. This benefits both passengers and staff and reduces the environmental impact relative to cars.

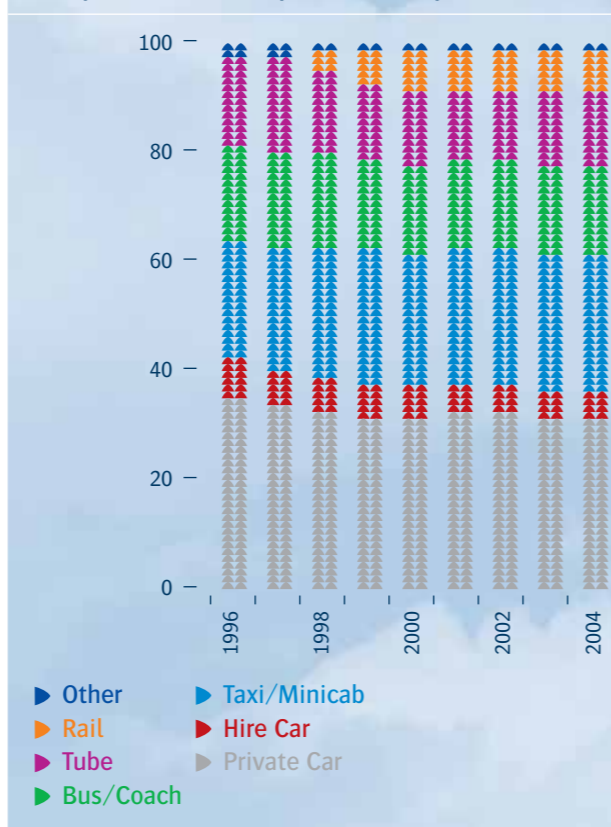
Aviation is seeking to play a full role in the emerging integrated transport system²⁰. More needs to be done to achieve good intermodal links at all airports. All airports in England and Wales with more than 1,000 passenger air transport movements a year have set up or are in the process of setting up an Air Transport Forum and preparing an Airport Surface Access Strategy embracing both passenger and staff transport.

Road traffic emissions are a major contributor to the air quality burden around airports. Ground vehicle exhaust emissions standards are tightening and should lead to a substantial reduction in emissions from ground traffic. Policies and initiatives in this area are also important to social aspects such as local congestion and parking. Airport master plans currently under development are required to address surface access - see box on page 38.

RECOMMENDATION TO GOVERNMENT

- Ensure that airports receive proper recognition within its integrated transport plans including the development of surface access links.

Transport access: example of modal split at Heathrow



6. Natural resources

THE ISSUE

Use and conservation of natural resources in ways that will not adversely affect the quality of life of generations to come is at the heart of nearly all interpretations of sustainable development. Thus it is important that the aviation industry not only addresses the impacts and issues that are clearly related to air transport, but also addresses others, in particular those affecting consumption and utilisation of natural resources.

PROGRESS TO DATE

Most of the major Sustainable Aviation signatories have long-established records of environmental resource management, and some already have their own internal sustainability strategies²¹.

Master plans

A requirement of the ATWP was that those airports which were identified as requiring expansion, and any other airports deemed of a certain size, should produce master plans. These would provide an indication of the airport operator's plans for infrastructure development, bringing greater clarity to those affected or with an interest, and demonstrate the costs and benefits of airport growth, including its social and environmental impacts.

It was anticipated that the master plans would address the following 'core' areas:

- forecasts
- infrastructure proposals
- safeguarding and land/property take
- surface access initiatives
- impact on people and the natural environment
- proposals to minimise and mitigate impacts.

With some exceptions, master plans are scheduled to be delivered by the end of 2005. Draft master plans are currently being reviewed by the DfT.

The Goal:

Continue to manage and limit the industry's overall environmental footprint.

Indicator

The list of companies producing externally verified reports covering environmental issues.

Discussion

Sustainable Aviation signatories recognise that, in addition to emissions and noise, aviation has other more general impacts on the UK environment, specifically the consumption of natural resources, land use, and impacts on biodiversity. This can be interpreted as the overall environmental footprint of the industry. Sustainable Aviation identified that many impacts are best addressed at the company sector level and that in this section we have sought to identify issues that cross companies and sectors.

Commitment 23

Achieve continuous improvement in the efficiency of use of energy and water use, and the management of waste, chemicals, water quality and environmentally sensitive materials.

Commitment 24

Make substantial progress in further limiting the environmental impact of supply chains.

Discussion

The industry is fully aware of its environmental obligations in respect of the careful use of natural resources, and Sustainable Aviation companies have been developing their environmental management systems with many having certified systems in place. This area of work is actively supported by the SBAC Environmental Special Interest Group and Commitment 24 reflects one of the ACARE goals. The

aviation industry, like others, faces ongoing challenges in resource and waste management. The focus is on programmes of continuous improvement and closer cooperation in achieving these aims. The Sustainable Aviation signatories will work closely together to establish best practice in this area and to encourage broader engagement in such best practice across the industry and through the supply chain. They will establish a basis for measurement and specify a path to improvement.

Commitment 25

For new developments requiring land, avoid the loss of natural and man-made heritage wherever possible.

Discussion

The development of a new runway or airport raises crucial issues within any society regarding the appropriate use of land, with associated implications for heritage and biodiversity. Wherever loss of heritage cannot be avoided, this should be minimised and mitigation measures should be developed and implemented. The development of Regional Spatial Strategies and Regional Transport Plans as part of the Regional Government planning process will provide a vital opportunity to address these issues in a strategic manner. Sustainable Aviation partners will be seeking to work with stakeholders to deliver effective land use planning to protect present and potential communities around airports, and manufacturing and supply centres.

Commitment 26

Review periodically the potential and practicalities of alternative fuels to aviation kerosene.

Discussion

The IPCC concluded in their 1999 report²² that "there would not appear to be any practical alternatives to kerosene-based fuels for commercial jet aircraft for the next several decades" although the report went on to state that "hydrogen may be viable in the long term, but would require new aircraft designs and new infrastructure for supply".

A study sponsored by Department of Trade and Industry (DTI), and carried out by a team from Imperial College with industry support, recently examined the potential for renewable energy sources, including jet fuel options. The study concluded that hydrogen could bring the greatest potential environmental benefits. However, hydrogen aircraft would emit large amounts of water vapour, from which the contribution to climate change is still uncertain. Engines might also have to be modified to keep NOx emissions within acceptable levels. Furthermore, there are significant safety and handling issues relating to the use of hydrogen. The costs of production suggest that synthetic kerosene from biomass could be the cheapest alternative, although in the long term the cost of hydrogen could drop significantly. Biofuel could be used as a kerosene extender. Fuel cells, probably based on hydrogen, could play a role for aircraft services power, but not in the near term.

It is clear that it will be much more feasible to convert ground transport and other energy-intensive industries to non-fossil fuels and it is unlikely that alternative fuels will play a significant role in aircraft propulsion in the foreseeable future. Nonetheless, the industry will support and encourage research projects to find possible replacements for kerosene, bearing in mind safety, aircraft performance, environmental impact over the whole life cycle, and logistical and economic considerations.

It is acknowledged that as supplies of fuel start to become restricted or more difficult to extract, the cost of fuels and the impact of associated economic instruments could in the future become a critical factor in determining ticket prices and hence demand.

RECOMMENDATIONS TO GOVERNMENT

- Review the relationship between provision of land for airport use within Regional Spatial Strategies and Regional Transport Plans.
- Delivery of effective land use planning to protect present and potential communities around airports, and manufacturing and supply centres, through full integration of the policies and strategic goals of the Office of the Deputy Prime Minister with other key government departments.

7. Economics

THE ISSUE

The aviation industry plays a vital role in the economy of the country and in supporting the regions. Air links are particularly important in some of the more remote regions of the UK. The economic aim is to maintain and develop a competitive and commercially viable aviation industry, which can continue to make a sustainable contribution to the UK economy. In order to achieve this, while meeting its environmental goals, it is necessary that the UK industry remains in good financial health and is allowed to compete on a level playing field.

PROGRESS TO DATE

UK air travel has increased five-fold over the last 30 years and the aviation industry has a major impact on the UK economy, with a direct value-added contribution to Gross Domestic Product (GDP) estimated at around £14 billion. More importantly, aviation makes a further substantial economic catalytic impact, boosting economic growth through its influence on business location and investment decisions, and the impact on economy-wide productivity performance (total factor productivity)²³. The huge range of international connections to the UK not only supports UK industry and commerce, but also is a key factor in attracting inward investment. Airports act as hubs for international business. In addition, high growth sectors in the UK economy such as pharmaceuticals, computers and electronics are particularly heavy users of air travel.

Around 260,000²⁴ people are employed in the UK aviation industry (including civil aviation manufacturing), with two and a half times as many jobs supported indirectly. UK aviation generates 6%²⁵ of UK exports, quite apart from the one third of exports that are carried by air²⁶. Concern has been expressed, however, over some aspects of aviation influence on local communities such as overheating of local economies.

Inward tourism is worth £12 billion per annum to the UK economy, £10 billion of which is derived from visitors arriving by air. Heathrow is the largest port of entry for UK visitors²⁷. On the other hand, UK travellers flying abroad spent nearly £24 billion in 2003. These two

separate markets reflect the attractiveness of the UK as a tourist destination and the importance of the tourism industry as a dynamic component of the UK economy, while allowing UK residents to take advantage of overseas travel opportunities.

Regeneration and regional airports

The Government Public Service Agreement SA2 Objective is to "Make substantial improvements in the economic performance of all English regions and over the long term reduce the persistent gap in growth rates between the regions." The DfT paper 'Aviation, Core Cities and Regional Economic Development' states that the "UK's core cities are still under performing by comparison with their international rivals" and that there is "a close correlation between the GDP of UK core cities and air route frequency, capacity and range of air destinations."

The importance of regional airports to the UK economy has increased in recent years. While growth in the number of passengers has increased by 78% between 1993 and 2003, the share taken by London airports has declined from 44% to 33%. Terminal passenger numbers in the North East, North West, Yorkshire, the West Midlands and Scotland have at least doubled in the last 10 years. Growth in the East Midlands has trebled and the East has shown the greatest percentage increase with passenger numbers up from 4.8 million to 26 million.

Nevertheless, there is evidence that the level of connectivity of UK core cities may be less than their EU equivalents, especially in the range of international destinations offered. As cities move towards knowledge cluster and service sector development, the importance of aviation links will increase. "The Regional Economic Strategies produced by the English Regional Development Agencies focus heavily on 'knowledge driven' and high value-added industries, all of which have a high propensity to fly...many also stress that global accessibility is the key issue to overcome the peripherality of the UK's regions in Europe and increase competitiveness." (ibid)

An example of this is the Northern Way Growth Strategy, which is specifically developing a transport strategy focusing on increasing the effectiveness of airports as drivers of regional growth.

Michael Roberts, Director, Business Environment, CBI

"UK aviation is a world-leader but its future lies in two things: sustaining access at the right price particularly to overseas markets within an increasingly global economy; and providing a model for how other companies here and abroad should exercise their responsibilities to people and planet alike."

The Goal:

A competitive and commercially viable aviation industry making a positive contribution to the UK economy.

Indicators

Market share and industry gross value added % of GDP due to the aviation industry.

Turnover and gross margin of individual companies.

Commitment 27

Play an active, on-going role in local economies close to all major sites, promoting regeneration and employment opportunities.

Discussion

Airports, airlines, manufacturing facilities and other supporting industrial activities play a significant part in their local communities, providing quality jobs and contributing to the wider regeneration of communities around airports and other major aviation sites.

Commitment 28

Maintain and develop commercially viable air links to support the UK economy and regional development.

Discussion

While some airlines and airports are key players in providing the global air transport connections that are essential for continuing economic prosperity, there is also an important regional aviation market - which may be served primarily by different players in the aviation industry - that contributes to the core Public Service Agreement target to reduce the

disparity in regional GDP. Aviation is particularly suited to providing access to remote and island communities.

To maintain a competitive network of air transport links it will be necessary to expand UK airports and other aviation infrastructure.

Commitment 29

Promote the maintenance and development of UK civil aviation manufacturing as a world class industry.

Discussion

The plan of action that industry and government identified for the aerospace industry, as part of the AeIGT, is currently being implemented. The main thrust of this change focuses on:

- ▶ spearheading international developments in sustainable aviation
- ▶ applied research and validation of new and innovative technologies
- ▶ radical industrial productivity improvements right across supply chains - essential to companies of all sizes
- ▶ development of a world class workforce, capable of delivering tomorrow's solutions
- ▶ development of competitive economic conditions in the UK that encourage industry to invest and succeed.

British industry will be much stronger, leaner and highly competitive as a result of this change programme. UK Aerospace is world class, with a leading science-based, and high value added, manufacturing sector. Both government and industry are facing up to the challenge to capitalise on a strong long term global market. Sustainable Aviation signatories support this commitment to the extent permitted by parent company policies.

RECOMMENDATIONS TO GOVERNMENT

- ▶ Remove obstacles to effective operation of the open market by liberalising bilaterals and other international agreements.
- ▶ Enhance the international competitiveness of the UK aviation industry through the pursuit of a level playing field.

²³ Oxford Economic Forecasting Ltd, 1999. The contribution of aviation to the UK Economy.

²⁴ Aviation figures from the ATWP, The Future of Air Transport, 2003 and civil aerospace figures derived from Society of British Aerospace Companies Facts and Figures 2003.

²⁵ 3% due to airlines and airports (OEF1999) and 3% due to civil aircraft manufacturing, derived from Society of British Aerospace Companies Facts and Figures 2003.

²⁶ ATWP, The Future of Air Transport, 2003.

²⁷ Office of National Statistics - ONS 2003.

8. Social

THE ISSUE

Like other industries, aviation needs to address its responsibilities to the many people with whom the industry interacts. The aviation industry employs a large number of people, both directly and also indirectly through its supply chains. It relies on long term relationships with customers to deliver its success. And it also has impacts on many others who live in communities around airports and other industry centres.

The industry is committed to building and maintaining constructive relationships with these key stakeholders. Relationships with employees will be managed on a company-by-company basis, whilst supply chain relationships are dealt with elsewhere in the strategy.

PROGRESS TO DATE

The UK aviation industry employs 260,000 people across the country in all ages and skill sectors, maintains an excellent safety record, and has an excellent world-wide reputation for the quality of its services. Aviation companies have long engaged with stakeholders over issues of concern, and in many communities they are regarded as responsible and integral parts of local economies and communities.

Ed Mayo, Chief Executive, National Consumer Council

"NCC fought successfully for cheaper air prices in the 1990s and we support a competitive air industry. We value air travel. But we accept that consumers have a responsibility, and that there are finite ecological limits that mean that the travel by one person carries costs that will be borne by others. It is the job of national and international politics to reconcile competing interests, and of government to make many of the changes required to internalise the costs of air travel. There are very significant trade-offs involved in moving towards the operation of aviation in a sustainable society. As a consumer group, concerned about today and tomorrow's consumers, we will continue to fight against rip-offs and anti-competitive collusion by business and we will support the argument that an aviation industry that is deeply unsustainable is a false victory for consumers."

The Goal:

An industry with constructive relationships with employees, local communities, customers and industry partners, meeting society's air transport needs.

Indicators

Number of employees within the industry.
Proportion of UK population that flies annually by air.

Commitment 30

Make a positive contribution to the skills, knowledge and motivation of all employees and provide a safe, healthy work environment.

Discussion

Aviation provides a large number of jobs within the UK. We believe that our people are our greatest asset.

The industry offers employment options at a very wide range of skill levels and provides a range of opportunities for rewarding work and opportunities for personal development, both for our direct employees and for those in our supply chain. Recruiting and retaining a work force with appropriate skills is important to the future of the industry, and will depend on continuing to invest in and develop our employees. Many companies have well developed staff development programmes providing opportunities for training, self-development and career

development. To meet the challenge of a changing working environment, some companies have established internal training programmes, some involving working with external institutions.

Employees expect to be provided with a working environment that is as safe and secure as possible. The industry has a strong record on health and safety and will seek to build on and strengthen its approach in future.

We also aim to ensure that our employment practices uphold fundamental human rights. This includes providing a working environment free from discrimination and harassment, and employing and promoting people regardless of gender, ethnic or national origin, disability, religious or cultural background. Some companies are already tracking progress in employment, and employment status, according to gender and ethnic group.

Companies can also influence how sustainability issues are addressed beyond their own direct operations and employees. Sustainable Aviation signatories aim to work with their suppliers to build their awareness of sustainability issues, in the context of also needing to deliver economic efficiency throughout the value chain. This includes working with suppliers to address relevant environmental issues. It also includes striving to ensure that the employment conditions of suppliers uphold fundamental human rights.

Sustainable Aviation itself provides an example of key elements of the industry's supply chain working together to make the whole industry more sustainable: aerospace manufacturing, airports and air traffic control are all key elements of the airlines' supply chain.

Commitment 31

Investigate consultative approaches leading to binding agreements as an agreed approach to the development of commercial airport infrastructure.

Discussion

Many people derive social and economic benefit from airports. However local communities have concerns over a number of aviation's impacts. Congestion, noise and local air quality feature among the top issues for communities close to major airports²⁸. While the effect of an airport on property values is generally thought to be negative, there is some evidence to the contrary. Although accidents involving aircraft are rare, there can be concern about the possibility of an aviation accident affecting local communities.

Many aviation companies have striven to develop good relations with neighbouring communities. This includes learning from innovative models such as constructive involvement of community representatives through information sharing. Such approaches played an important part in recent developments of aviation capacity, for example, at Manchester and Gatwick airports.

Commitment 32

Deliver high quality service to passengers.

Discussion

A high standard of customer service is essential to the success of the aviation industry. The 'end' customer is the passenger or the organisation moving freight and it is essential that legitimate concerns are addressed. The industry is committed to continue to improve the quality of the service it provides through dialogue with customers and voluntary measures to improve their satisfaction with the services provided and will deliver its commitment through support and adherence to the airport and airline sectors' 'voluntary commitment on air passenger service'.

Rick Stathers, SRI Manager, Schroders

"Sustainable aviation will deliver continued social benefits through the efficient transport of goods and people and the provision of jobs. However, these benefits need to be delivered in a manner which integrates the environmental and social impacts of aviation within the cost of air travel, not just at a European level, but an international one."

Safety and security are also paramount considerations. Our customers expect us to provide opportunities to travel in ways that are as safe and secure as possible. The strong record of the industry in the area of safety, security and health, and in addressing related public concerns, has been achieved through a focus on these issues, in cooperation with government and other relevant national and international bodies. The industry will seek to build on the current institutional arrangements covering these issues.

Commitment 33

Continue to meet the requirements of people for access to aviation.

Discussion

The aviation industry brings people together for social, cultural, business and political interchange. Through the facilitation of exchange of knowledge and ideas, aviation acts as a spur to innovation.

Historically, aviation has been available only to the well off. Today, people expect the ability to travel, and air transport is increasingly available at prices a growing number of people and organisations can afford. Key regional services are provided to maintain essential links for those living in remote areas, for example, in the Highlands and Islands. In addition, aviation often provides the main, if not sole, means for rapid response to disasters requiring medical response, humanitarian assistance, and/or action to protect the environment.

In the UK, the perception that air travel is elitist is now fading into history. Over the last 40 years, the price of aviation has decreased by 70%²⁹, thereby increasing its accessibility to a broader stratum of society. Around 50% of the UK population has flown within one calendar year³⁰.

Commitment 34

Engage with the tourism industry to coordinate approaches to sustainable development issues and clarify areas of responsibility.

Discussion

The aviation and tourism industries are closely linked. For example, leisure is the primary purpose of UK air travellers. Some tourism operators are closely integrated with their own airlines, which offer an increasing range of destinations and services. The tourism industry, through organisations such as the Travel Foundation, tends to concentrate on the sustainability aspects at destinations.

Brendan Barber, TUC General Secretary

"The TUC welcomes the aviation industry's engagement with the challenge of climate change. The Sustainable Aviation is a serious first step towards joining aviation with global efforts to tackle climate change. The TUC urges the Government to use its EU Presidency to kick start the inclusion of aviation emissions within the EU emissions trading scheme by 2008."

Appendices

Appendix I

GLOSSARY

ACARE:	Advisory Council for Aeronautical Research in Europe	IPCC:	Intergovernmental Panel on Climate Change
AeIGT:	Aerospace Innovation and Growth Team	Leq:	Energy equivalent noise level
ANSP:	Air Navigation Service Provider	NATS:	National Air Traffic Services
AOA:	Airport Operators Association	NERC:	National Environmental Research Council
APU:	Auxiliary Power Unit	NGO:	Non-Governmental Organisation
ATC:	Air Traffic Control	NOx:	Oxides of Nitrogen
ATM:	Air Traffic Management	NO ₂ :	Nitrogen dioxide
ANSP:	Air Navigation Service Provider	NPR:	Noise Preferential Route
ATWP:	Air Transport White Paper	PM ₁₀ :	Particulate matter which passes through a size-selective inlet with a 50% efficiency cutoff at 10 micrometre aerodynamic diameter
BATA:	British Air Transport Association	SBAC:	Society of British Aerospace Companies
CDA:	Continuous Descent Approach	UNFCCC:	United Nations Framework Convention on Climate Change
CO ₂ :	Carbon Dioxide		
dB:	Decibel		
DEFRA:	Department for the Environment, Food and Rural Affairs		
DfT:	Department for Transport		
DTI:	Department of Trade and Industry		
ETS:	Emissions Trading Scheme		
EU:	European Union		
EUROCONTROL:	European Organisation for the Safety of Air Navigation		
Externalities:	An externality is the effect of a transaction on a third party who has not consented to or played a role in the carrying out of that transaction (Milton Friedman).		
GDP:	Gross Domestic Product		
GWP:	Global Warming Potential		
ICAO:	International Civil Aviation Organization		

Appendix II

CONTRIBUTORS

INTERNAL STRATEGY DEVELOPMENT

SUSTAINABLE AVIATION STEERING COMMITTEE

Kathryn Barker (BAA)	Ian Jopson (NATS)
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Participants in Stakeholder Consultation Meeting: see website.

*This strategy is endorsed by the companies listed on page 8 of this document. The Sustainable Aviation Steering Committee has taken into account the views of individuals and organisations consulted as part of the strategy development process. This does not imply the endorsement of the strategy by those consulted.

Appendix III

FULL LIST OF GOALS AND COMMITMENTS

Implementation and communication

Full industry commitment to sustainable development, and a broader understanding of the role of aviation in a sustainable society.

1. Progressively strengthen the Sustainable Aviation goals and encourage all aviation companies to endorse the strategy and participate in its delivery.
2. Report formally and publicly on progress towards the strategy's goals and commitments every two years, with the first review in the autumn of 2006.
3. A Sustainable Aviation Governance Framework, to facilitate progress towards achieving the strategy's goals.
4. UK aviation companies will develop, implement and encourage best practice among industry partners across sustainable development issues.
5. Provide the means for communication on issues related to aviation and sustainable development, including stakeholder dialogue, through the ongoing Sustainable Aviation process.

Climate change

Aviation incorporated into a global policy framework that achieves stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man-made interference with the climate system.

6. Airline and airport signatories to build support and assist policymakers in developing practical solutions for inclusion of aircraft CO₂ emissions in the EU Emissions Trading Scheme by 2008, or as soon as possible thereafter, as a first step towards a global approach.
7. Take a proactive role towards securing a positive engagement from the international aviation community to support measures to address climate impacts.

8. Provide relevant data and expertise for the scientific community to enhance understanding of the non-CO₂ atmospheric effects of aviation, and support improvements in metrics for quantifying and reporting effects.
9. Propose appropriate mechanisms by 2012 for mitigating non-CO₂ effects based on a consensus of scientific understanding.
10. Continual improvement in technology and air traffic management towards the ACARE emission targets; to improve fuel efficiency by 50% per seat kilometre, including up to 10% from air traffic management system efficiencies, and reduce NO_x emissions by 80%, by 2020 based on a new aircraft of 2020 relative to an equivalent new aircraft in 2000.
11. Develop and implement common reporting of total CO₂ emissions and fleet fuel efficiency by airline by end of 2005.
12. Inform passenger understanding of the climate impacts of air travel, including evaluating carbon offset initiatives as a practical short-term measure. Provide an update by the end of 2006.

Noise

Limit and, where possible, reduce the number of people affected by aircraft noise in the UK.

13. Continual improvements in technology and operations towards the ACARE goal of 50% reduction in perceived external noise by 2020 based on new aircraft of 2020 relative to equivalent new aircraft in 2000.
14. Where appropriate and not already in place, plans for community-related mitigation initiatives to be completed by 2007.
15. Develop and promote low-noise flight procedures through evaluation of future operational methods and implementation of best practice, for example: evaluating implementation of steeper and curved approaches for noise abatement at relevant airports; completing a CDA outreach programme at all main airports by end 2006; and assessing the feasibility of a best practice guide for environmentally optimum departure procedures, balancing both noise and local air quality requirements, by end 2006.

16. Support operating restrictions at particular airports, where these are shown to be proportionate and necessary, and less restrictive solutions are not available.
17. Continue to engage with noise-affected communities and develop local airport noise communication programmes by 2007, tailored to the needs of those communities.

Local air quality

Industry playing its full part in improving air quality and meeting air quality regulatory requirements at sensitive airport locations.

18. Contribute to air quality measurement programmes and aid research to improve the assessment of aircraft and airport emissions to enable a better understanding, by 2007, of their actual contribution to local air quality close to airports.
19. Continual improvement in technology towards the ACARE target of an 80% reduction in NO_x emissions by 2020 based on new aircraft of 2020 relative to equivalent new aircraft in 2000.
20. Deliver continued improvements in airport ground vehicles, supply of ground power services, operational practice and the availability of cleaner fuels, in order to reduce NO_x emissions. Report on progress by end 2006.
21. Quantifying trade-offs between NO_x, noise and CO₂ emissions, so that these are taken into consideration by relevant regulators when setting future requirements.

Surface access

Industry to play its full part in the development of an integrated transport system.

22. Completing, by 2007, establishment of surface access strategies for each airport and those companies located at airports, within Air Transport Forums, for staff, freight and passengers.

Natural resources

Continue to manage and limit the industry's overall environmental footprint.

23. Achieve continuous improvement in the efficiency of use of energy and water use, and the management of waste, chemicals, water quality and environmentally sensitive materials.

24. Make substantial progress in further limiting the environmental impact of supply chains.
25. For new developments requiring land, avoid the loss of natural and man-made heritage wherever possible.
26. Review periodically the potential and practicalities of alternative fuels to aviation kerosene.

Economics

A competitive and commercially viable aviation industry making a positive contribution to the UK economy.

27. Play an active ongoing role in local economies close to all major sites, promoting regeneration and employment opportunities.
28. Maintain and develop commercially viable air-links to support the UK economy and regional development.
29. Promote the maintenance and development of UK civil aviation manufacturing as a world-class industry.

Social

An industry with constructive relationships with employees, local communities, customers and industry partners, meeting society's air transport needs.

30. Make a positive contribution to the skills, knowledge and motivation of all employees and provide a safe, healthy work environment.
31. Investigate consultative approaches leading to binding agreements as an agreed approach to the development of commercial airport infrastructure.
32. Deliver high quality service to passengers.
33. Continue to meet the requirements of people for access to aviation.
34. Engage with the tourism industry to coordinate approaches to sustainable development issues and clarify areas of responsibility.

Appendix IV

THE STRATEGY PROCESS

Sustainable Aviation has been developed as part of an initiative by the DTI and DEFRA aimed at encouraging the development of sustainability strategies for different industrial sectors. The Sustainable Aviation process is based on Best Practice Guides prepared for that programme³¹ seeking to gain from the experience of those industries that have already developed strategies and to develop the process further where appropriate.

More specifically, Sustainable Aviation originated from a specific request to Greener by Design from the AelGT. A Steering Committee was established in March 2004 through Greener By Design. The project has been established by the following four industry sectors represented on that committee (see Appendix II for full membership).

- ▶ Airlines, through BATA.
- ▶ Airports, through AOA.
- ▶ Aircraft and engine manufacturers, through the SBAC.
- ▶ Air Navigation Service Providers, through NATS.

It was decided to limit the scope of Sustainable Aviation initially to UK commercial aviation. It was acknowledged however, that in areas such as Air Traffic Management other elements of aviation such as General Aviation and Military Aviation would need to be consulted.

A feature of the Sustainable Aviation approach relates to Stakeholder Consultation. Sustainable Aviation has adopted an open approach to its stakeholders. A Reference Group was established, combining the Steering Committee with leading representatives of key stakeholder organisations. Consultation with a much broader range of stakeholders has also been an integral part of the process. The report of this consultation process is set out on the website³². Whilst the strategy has been developed primarily through the Steering Committee, supported by a group of industry experts (the Industry Group), a much wider range of inputs has been drawn upon through the Reference Group and Stakeholder Consultation. Comments from the members of the

Reference Group and from the Stakeholder Consultation have been carefully considered in preparation of the strategy. However, the strategy has not been endorsed by individuals or organisations other than those listed at the beginning of the document.

Sustainable Aviation adopted a systematic approach to identifying the key issues. Using a range of source material and direct input from the Steering Committee a comprehensive list of sustainability impacts for aviation was drawn up. These were then processed through a two-stage filter process to set aside those impacts that were considered better addressed at the individual company or sector level, leaving a core list of strategic issues for the broader aviation industry. This list was modified in the light of input from the Reference Group and from Stakeholder Consultation. This document has been designed to address these strategic issues.

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