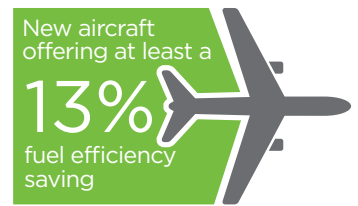
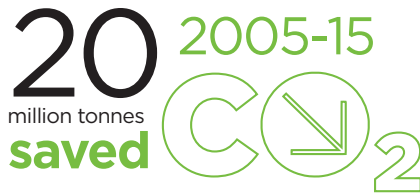
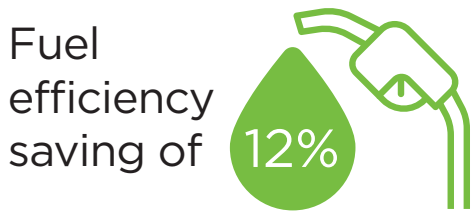
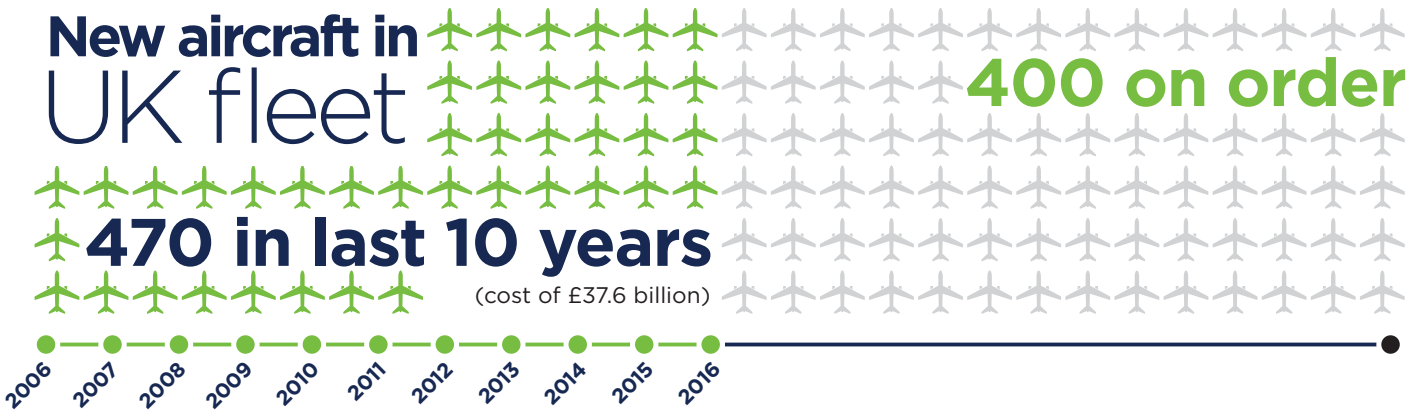


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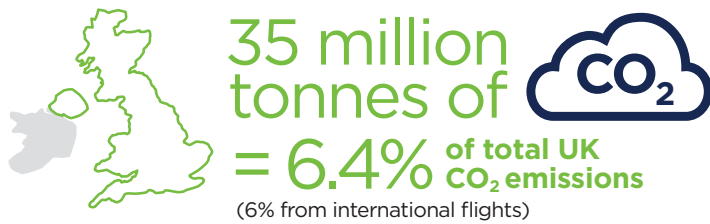
UK AIRLINES

RESPONDING TO THE CARBON CHALLENGE





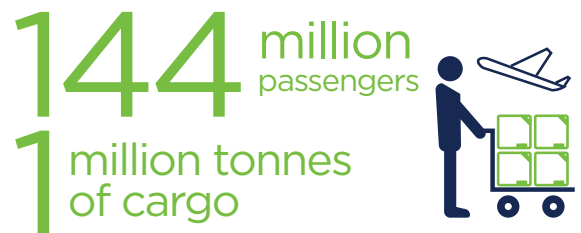
UK aviation CO₂ emissions



Industry data



Airlines UK members carried



Goods worth



representing



EXECUTIVE SUMMARY

UK airlines are delivering sustainable growth to meet UK business and leisure passenger travel as well as cargo needs. Around 23 million extra passengers were carried in 2015 compared to 2005 and new aircraft and more efficient flights have delivered this growth whilst saving 20 million tonnes of carbon dioxide (CO₂) emissions in the process. Flights by UK airlines are 12% more fuel efficient now than in 2005, in part due to over 470 new aircraft that have come into service in the last 10 years. This is set to continue with a further 400 new aircraft still on order. Taken together, this represents a combined investment in new aircraft by UK airlines of around £80 billion.

Further opportunities to reduce CO₂ emissions remain: by modernising UK airspace; introducing sustainable aviation fuels; continuing to develop new, more fuel-efficient aircraft; and through investment in the internationally agreed aviation CO₂ offsetting scheme agreed at the International Civil Aviation Organisation (ICAO) in October 2016.

Airlines UK members are committed to continuing this work to reduce CO₂ emissions and meet the global industry target of a 50% reduction in global aviation emissions by 2050.

However, it is essential that the UK Government continues to support the wider aviation industry to realise its aspirations.

Airlines UK and its members therefore ask the Government to:

- **Prioritise and support industry efforts to deliver airspace modernisation as set out in the existing Civil Aviation Authority Future Airspace Strategy thereby delivering a potential carbon saving by 2050 of between 9% and 14%.**
- **Include airspace, as a critical part of the UK's national infrastructure which requires long-term strategic decision making, in the remit of the National Infrastructure Commission.**
- **Deliver legislation for including all sustainable aviation fuel producers in the Renewable Transport Fuel Obligation.**
- **Provide a clear long-term policy to encourage UK sustainable aviation fuel production and use and delivering an 18-24% CO₂ reduction by 2050.**
- **Work with the industry to avoid duplication or competitive distortion for UK airlines between global and regional aviation carbon trading and offsetting schemes.**
- **Start negotiations with other countries to agree how the internationally agreed aviation CO₂ offsetting scheme will deliver a halving of global airline net CO₂ reductions by 2050.**
- **Continue to invest in and support the UK aerospace industry in its efforts to deliver affordable, new aircraft technology and grow the number of high value jobs in the UK.**



FOREWORD

UK aviation is a growing success story. More than 251 million passengers passed through a UK airport in 2015 – a record number – and our airlines, which operate from more than 40 airports across the country, carried 144 million people, and 1 million tonnes of cargo. The industry is worth almost £50 billion to our national income and contributes north of £8 billion in tax revenue to the Treasury annually.

The sector is in an excellent position to meet the UK’s ever-growing demand for air travel, but this needs to be done in a way that limits its environmental impact and ensures that it hits its stringent targets on emissions reduction. This timely report from Airlines UK sets out in detail the carbon impact of UK aviation. It is clear that airlines are making enormous efforts to reduce their carbon emissions and negative externalities. Further work is needed, some of it requiring Government support, but the direction of travel is positive and is to be applauded.

The report is a welcome contribution to the wider debate about aviation emissions. It complements and supports the work carried out by Sustainable Aviation, in particular its 2016 Carbon Road-Map, which demonstrates the potential for the UK to accommodate significant growth in aviation to 2050 without a substantial increase in CO₂ emissions, thanks to a better than doubling of carbon efficiency.

We hope the following pages will help to set the record straight about the strides and advances UK airlines – working closely with partners across the industry – have made in responding to the carbon challenge and the future, exciting opportunities that lie ahead.



Graham Brady MP

MP for Altrincham and Sale West
Chair of the Conservative 1922 Committee



Tim Alderslade

Chief Executive
Airlines UK

Airlines contribute enormously to the vibrancy of the UK economy:



Direct contribution to GDP of **£5.2 billion**



Overall contribution to GDP of **£10.9 billion**, when the effects of the supply chain and workforce are added



Support around **200,000 jobs**



Goods worth **£116 billion** shipped by air between the UK and non-EU countries, representing 35% of the UK’s extra-EU trade by value



The express air freight sector facilitates **£11 billion** of UK exports a year and supports over **38,000 jobs** in the exports industry

INTRODUCTION

The aviation sector’s global carbon dioxide (CO₂) emissions are rightly a key area of concern for UK policy makers, the public and the industry itself. There is currently extensive work underway within the UK airline industry to tackle this challenge, something that is not always understood by stakeholders concerned about the issue.

This report details the size of CO₂ emissions from UK aviation and how UK airlines are working to reduce these for the sustainable development of the industry. There are some amazing and innovative opportunities here to help deliver sustainable growth across the sector. Airlines UK members are keen to develop these but in some cases Government support may be required to achieve success.

ABOUT AIRLINES UK AND THE UK AIRLINE INDUSTRY

Airlines UK is the trade body for UK registered airlines and has been in existence for over 40 years. Our members cover all sectors of the industry, carrying over 144 million passengers and 1 million tonnes of cargo each year, and are responsible for more than 98% of UK airline operations. More broadly, UK airlines contribute over £11 billion to the economy and support around 200,000 jobs.



AIRLINES UK
THE ASSOCIATION OF UK AIRLINES

The UK has the third largest aviation network in the world, after the USA and China and our members play a key role in helping maintain this world-class and economically beneficial status.

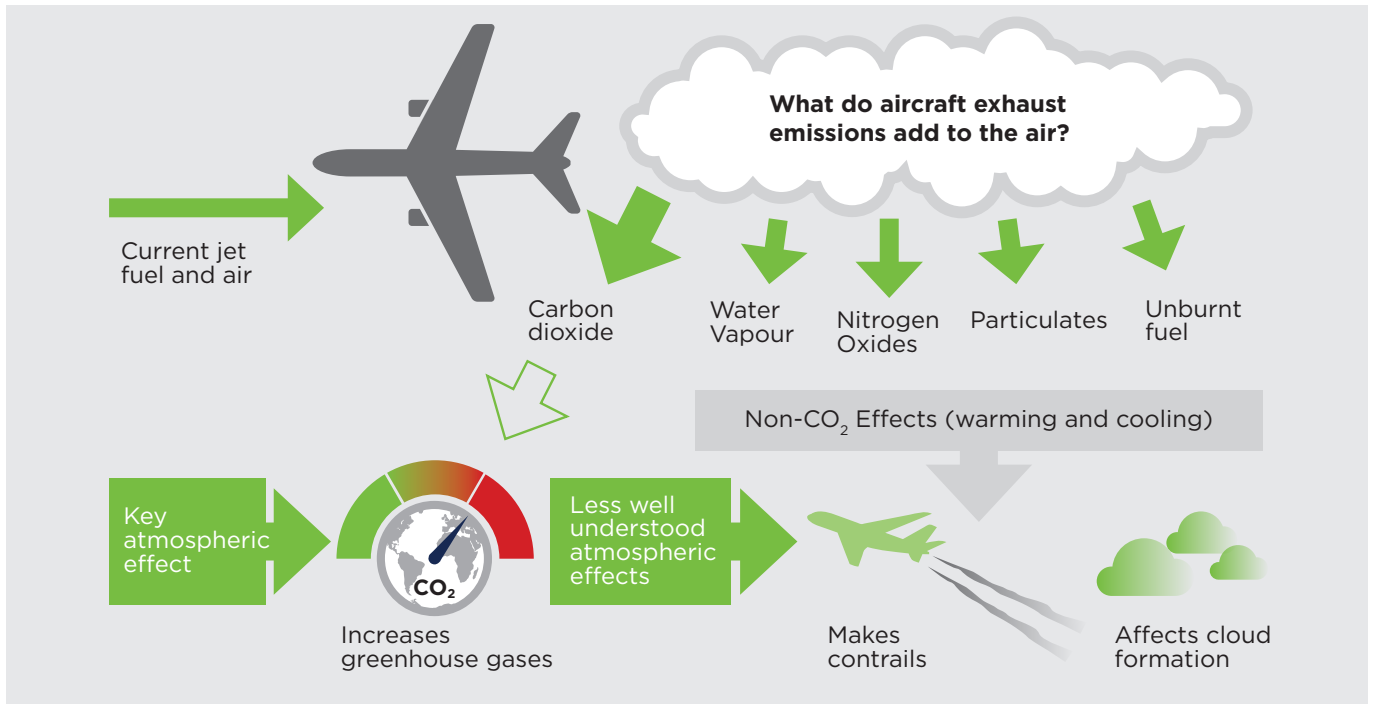
					
					

Between them, Airlines UK members operate to most parts of the world, directly employing over 76,000 staff and more than 815 aircraft.

Since 1991 the number of UK airline passengers carried has grown by over 90 million¹ in response to growing demand for business and leisure air travel, and growth has also taken place to meet the needs of the air freight market.

¹ Derived from UK Government transport statistics for UK airline total passengers uplifted. See http://webarchive.nationalarchives.gov.uk/20050301192906/http://dft.gov.uk/stellent/groups/dft_transstats/documents/page/dft_transstats_023379.pdf and <https://www.gov.uk/government/statistical-data-sets/tsgb02#history>

HOW AIRCRAFT EMISSIONS CONTRIBUTE TO CLIMATE CHANGE

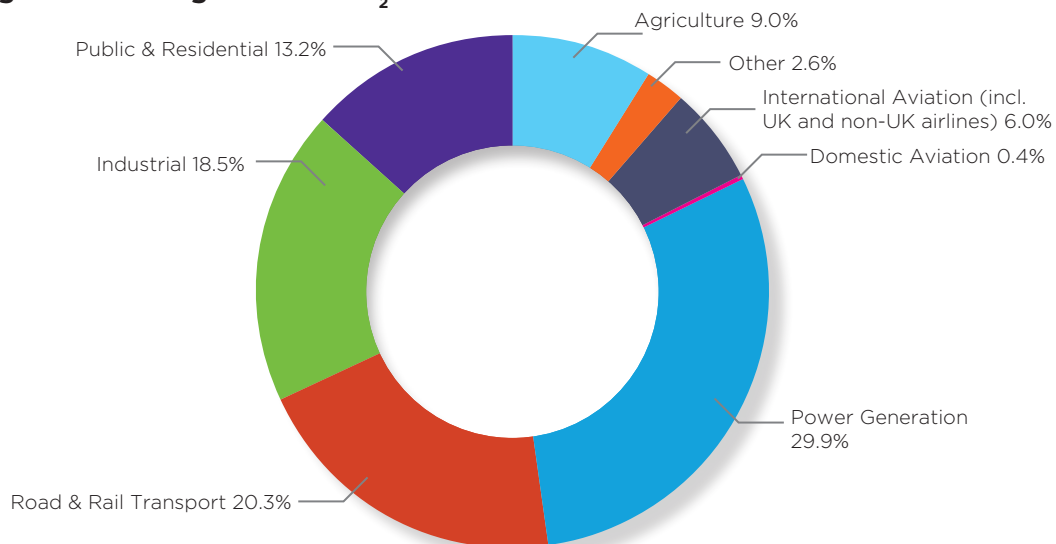


Reducing the amount of fuel used by aircraft and supporting the development of new fuels which result in much lower emissions remain priority areas for UK airlines in tackling this issue.

UK AVIATION EMISSIONS

Government data on UK aviation CO₂ emissions is produced by adding fuel used on UK domestic flights with additional aviation fuel uplifted at UK airports for international flights. Consequently, all flights, from all airlines, operating in the UK are captured. Using this data, UK aviation CO₂ emissions are:

- **35 million tonnes of CO₂ in 2014². (most recently available data)**
- **6.4% of total UK CO₂ emissions (6% from international flights)**
- **0.1% of global human generated CO₂³**



Sources of UK CO₂ emissions 2014

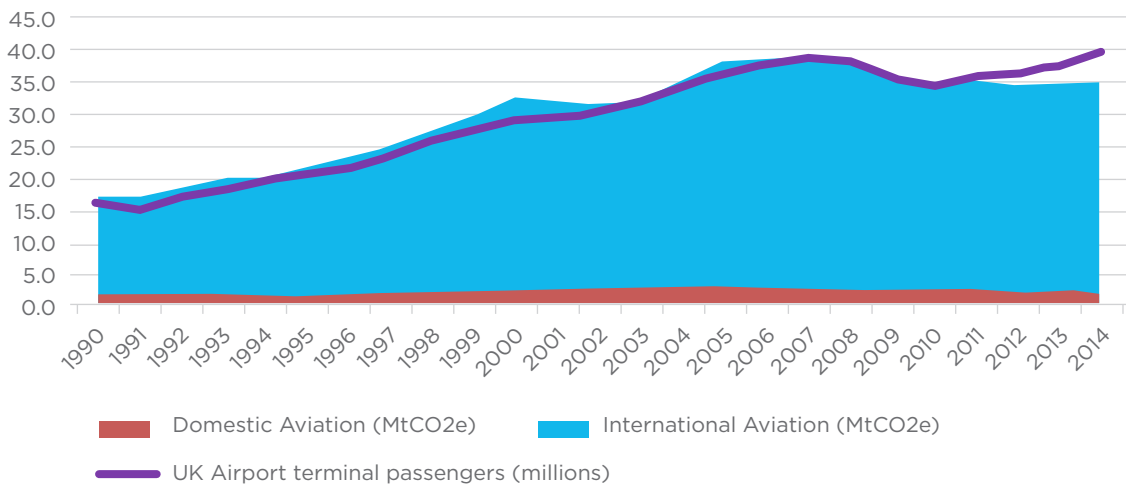
² <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2014> data tables 3 and 8.
³ United Nations Statistics Division, CDIAC, Data last updated on 29 July 2014.

CHANGE IN UK AVIATION CO₂ EMISSIONS

Although emissions from UK and non-UK airline flights operating to and from the UK doubled between 1990 and 2006 they have plateaued since then. Government data shows that in 2015, jet fuel deliveries to UK airports, for UK and non-UK airline operations, were 10% lower than in 2006⁴ despite 20.9 million more air passengers being carried⁵.

In summary, from 2006 to 2014, for the first time, growth in UK aviation has been delivered without any increase in CO₂ emissions.

UK Aviation Emissions



Source: UK Government Greenhouse Gas Emissions⁶ and UK Airport Passengers⁷

UK AIRLINE CO₂ GOALS AND OBJECTIVES

In 2009, international groups, representing airlines, manufacturers, airports and air navigation service providers agreed a set of industry goals to address CO₂ emissions:

Global Aviation CO ₂ Targets		UK airline progress towards target
Average fuel efficiency improvement of 1.5% per annum 2010 to 2020		Achieved an average 1.9% fuel efficiency improvement per annum since 2010
Carbon neutral growth from 2020		UK airlines have signed up and are on track to achieve
50% reduction of net CO ₂ emissions in 2050 relative to 2005		UK airlines have signed up and are on track to achieve

4 See Digest of UK Energy Statistics 2016 <https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

5 UK airport terminal passenger figures from the Government excluding the double counting of domestic traffic.

See <https://www.gov.uk/government/statistical-data-sets/tsgb02> and <http://researchbriefings.files.parliament.uk/documents/SN03760/SN03760.pdf>

6 See table 3 and 8 <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2014>

7 UK airport terminal passenger figures from the Government excluding the double counting of domestic traffic.

Prioritising actions to reduce CO₂ emissions

In order to meet these goals and tackle CO₂ emissions a four 'pillar' approach has been developed:

1. Investing in new aircraft
2. Maximising fuel efficiency per flight
3. Investing in sustainable aviation fuel
4. Investing in carbon trading or CO₂ offset schemes

In this country, Airlines UK is working as part of Sustainable Aviation, an organisation which brings together the main players across the UK aviation industry, to collaborate on a long-term strategy to achieve these CO₂ emission targets. These mirror the key areas that have been identified in the Sustainable Aviation CO₂ Road-Map.

The rest of this report details what the Airlines UK members are doing on each of the four pillars.

INVESTING IN NEW AIRCRAFT

Since 2005, UK airlines have introduced more than 470 new aircraft into service, representing an investment of over £37.6 billion at 2014 prices⁸.

In order to respond to future demand for air travel and air freight, Airlines UK members have placed orders for 397 aircraft. This investment represents over eleven and a half years' worth of Airlines UK members pre-tax profits, assuming all of the airline's profits are given over to paying for new aircraft.

These new aircraft offer at least a 13% fuel efficiency improvement over the existing aircraft operated.

Fuel Efficiency improvements of new Airbus and Boeing Aircraft



A320neo

13-15% more fuel efficient than current A320 aircraft



A350 XWB

25% more fuel efficient than current aircraft it is designed to replace



B737 MAX

14% more fuel efficient than current B737 aircraft



B787

20% more fuel efficient than current B767 aircraft

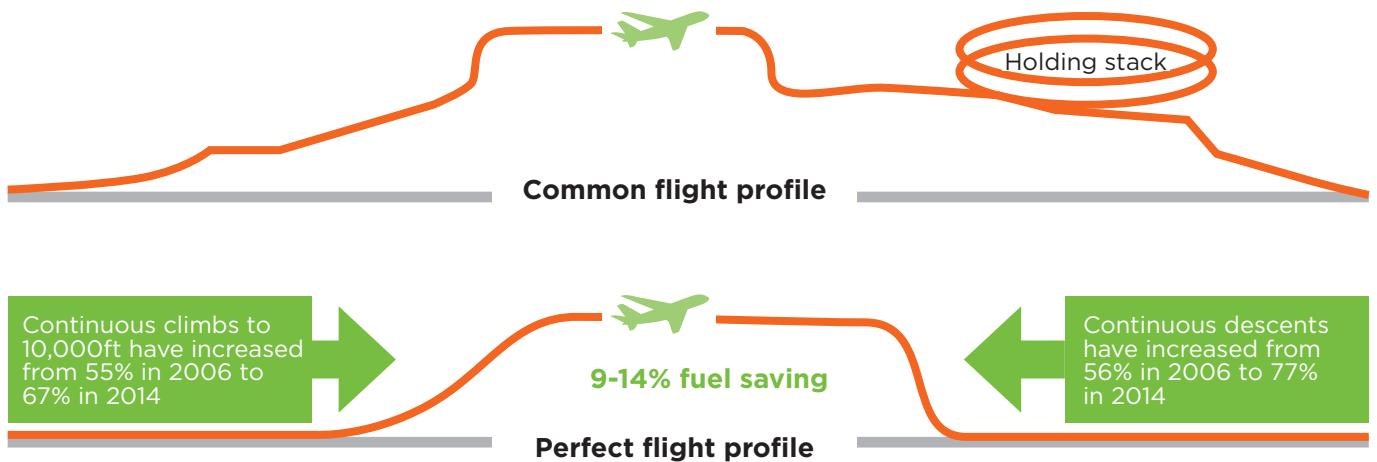


Summary of UK airline new aircraft



CUTTING THE AIR MILES

Airlines UK members are also working hard to make the route aircraft fly more direct, with an uninterrupted climb and descent. Additionally, by having aircraft taxiing without all their engines running, (known as reduced engine taxiing), airlines are saving thousands of tonnes of fuel a year.



By keeping aircraft higher for longer, continuous descents offer triple benefits: reduced CO₂ emissions, reduced noise of up to five decibels below the approach path and reduced fuel costs. Airlines UK members have partnered with 22 airports and 15 air traffic approach units to support the Sustainable Aviation Continuous Descent Operations (CDO) Campaign.

As a result of this campaign, significant improvements in performance were recognised by Business in the Community, in their 'Responsible Business' award for 2015 and 2016⁹.

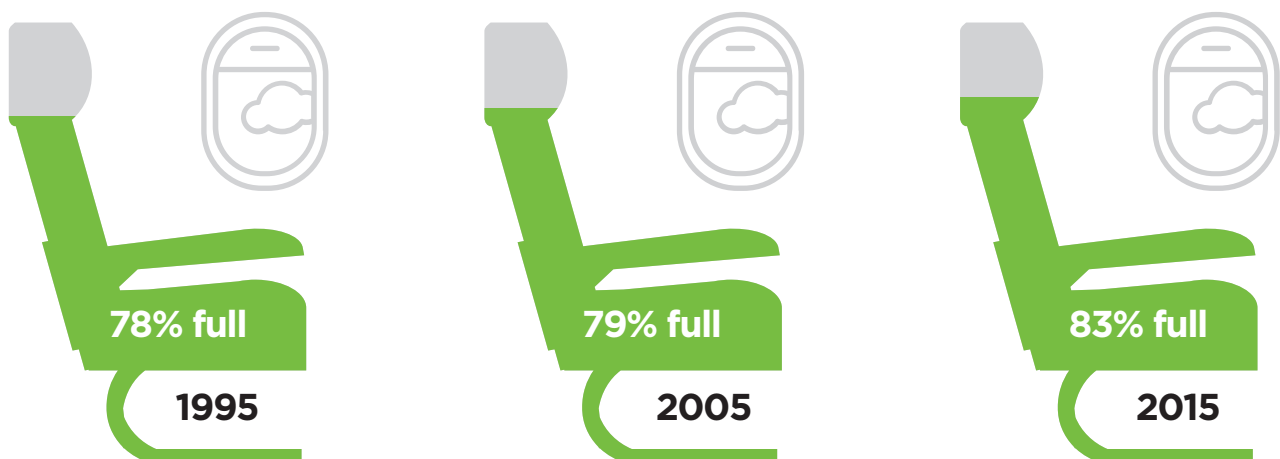
Further improvements to the efficiency of departing flights and how they climb away from the airports have been achieved. The Sustainable Aviation 2015 Progress Report quantified that this work has resulted in reductions in excess of 21,000 tonnes CO₂ emissions in the UK.

Airlines UK members have also been involved in larger airspace trials beyond the UK border, including:

- **Topflight** - A collaborative project to improve the efficiency of transatlantic flights. Airlines UK members worked with aircraft manufacturers plus the UK and Canadian air traffic control authorities. The trial proved the opportunity to cut fuel burn by 2% for each transatlantic flight. That equates to a reduction of over 2,500 kg of CO₂ per transatlantic flight.
- **Cross Border Arrival Management Trial (XMAN)** - This trial aimed to reduce the amount of time aircraft spend in the airborne holding pattern on arrival to Heathrow airport. Airlines UK members worked closely with UK air traffic control providers on the trial. XMAN works by monitoring the number of flights arriving to Heathrow, and where this volume would result in aircraft having to enter a holding stack, a message is sent to the aircraft asking it to slow down. This trial applied to all arriving aircraft up to approximately 350 miles from Heathrow. In 2014 British Airways saved approximately 2,200 tonnes of fuel, reducing CO₂ emissions by over 6,600 tonnes, using XMAN. The trial was subsequently extended to aircraft up to 550 miles from Heathrow, saving even more fuel. To date, NATS, the UK air traffic control authority, has recorded a reduction of up to one minute in holding times for those flights using XMAN. NATS report that this equates to annual savings of 15,000 tonnes of CO₂, as well as a reduction in noise for communities beneath the holding stacks. Heathrow XMAN was originally introduced as a trial but entered permanent operational deployment in November 2015.

FILLING EVERY FLIGHT

Average occupation of Airlines UK member flights

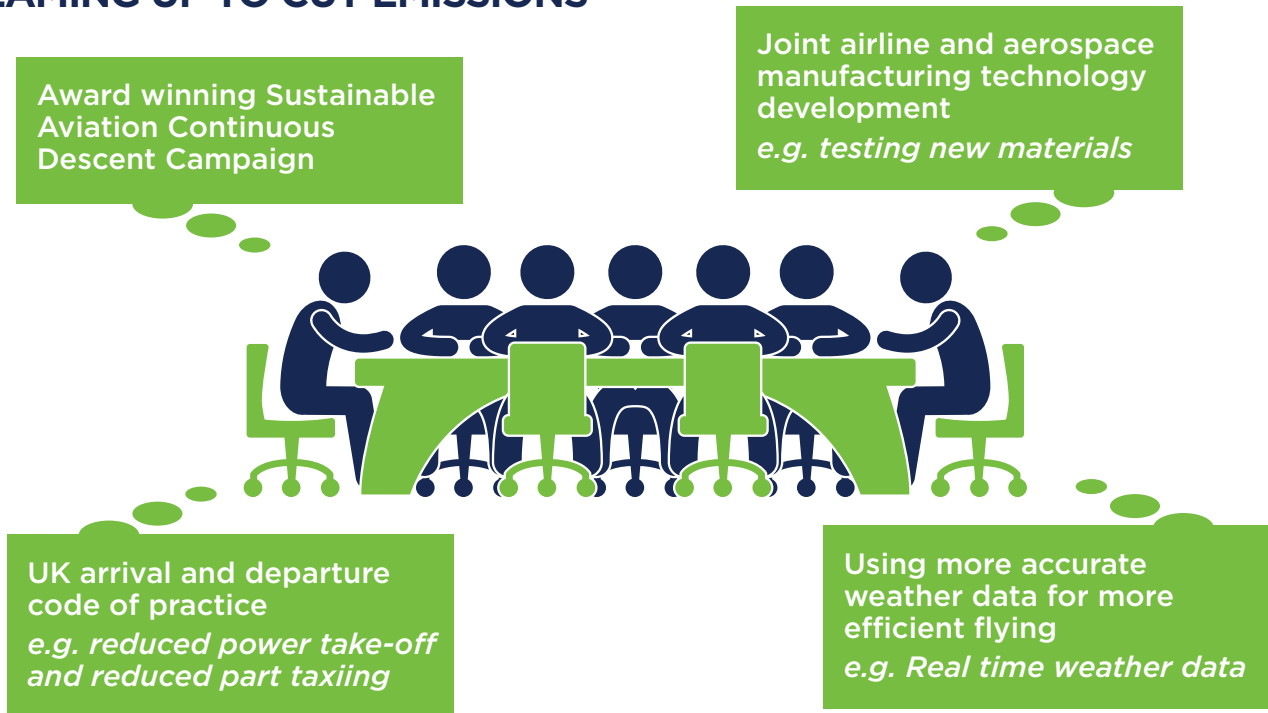


Source: Civil Aviation Authority UK Airline Statistics

Filling each plane is important in ensuring the most efficient fuel consumption and CO₂ output figures per flight. This has been achieved by increasingly complex and intelligent airline booking systems that use previous booking patterns to assist the airline in ensuring the right sized plane is used for each flight. During the summer months, many Airlines UK member flights perform even better than the average performance figures stated, with load factors consistently above 90%.

⁹ See <http://www.sustainableaviation.co.uk/sustainable-aviation-campaign-recognised-second-year-running-responsible-business-awards-2016/>

TEAMING UP TO CUT EMISSIONS



UK airlines are also involved in a wide range of innovative fuel efficiency work with other sectors of the industry. Further examples of this work include:

- **Testing more fuel efficient operating procedures** for aircraft in partnership with the airline operations and engineering teams, aircraft and engine manufacturers and air traffic controllers. Two specific examples of this work are:
 - Optimising the engine thrust settings used for take-off. Depending on weather conditions and the operating weight of the aircraft, it may be possible to reduce the engine power used. Once any safety matters have been fully addressed, operational concerns and environmental benefits are assessed. So long as the testing is successful, the new procedure is adopted. This involves many logistics tasks from updating the aircraft flight manual, editing airline crew operating procedures and carrying out flight crew training.
 - Moving aircraft to and from the runway without all their engines running. Data from work so far indicates that Airlines UK members are saving thousands of tonnes of fuel a year.
- **Using Real time weather.** Working with meteorologists, Airlines UK members have improved the use of real time wind and temperature data to optimise the aircraft flight, for instance avoiding stronger headwinds. The new method involves updating the aircraft flight management system during the flight. The aircraft computer then provides information to tell the aircraft when to climb to an optimal altitude. One airline, British Airways, has reported savings of 150-600kg CO₂ per flight.
- **Trialling new materials.** Airlines UK members regularly work with the aircraft and engine manufacturers to trial new materials to improve fuel efficiency. One airline, Tui, partnered with Boeing for a phase of their ecoDemonstrator Programme, which aimed to accelerate the development and testing of environmental technologies to reduce noise and CO₂ emissions from commercial aviation. This trial tested a new wing coating to prevent insects from sticking to the front edge of the wing, thereby reducing drag on the aircraft and increasing fuel efficiency.

WHAT HAS THIS ACHIEVED?

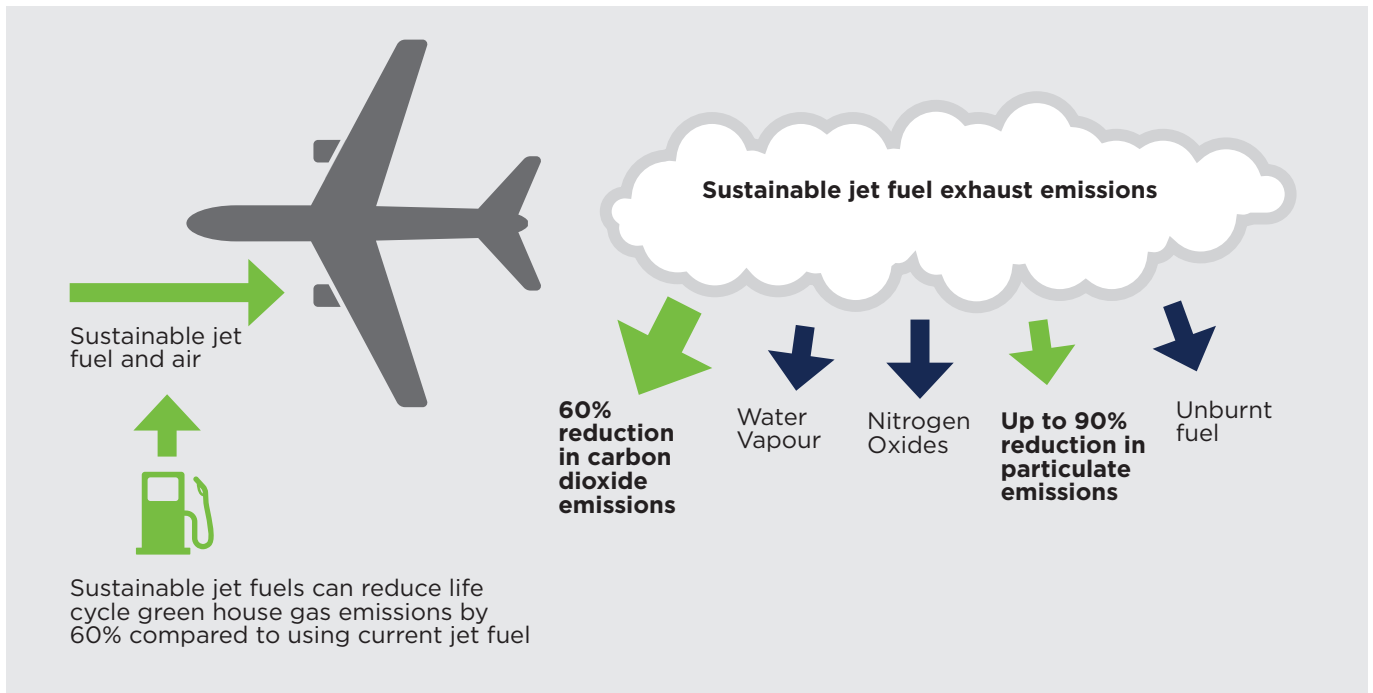
As a result of 10 years of investment in fuel efficiency work by Airlines UK members, 20 million tonnes of CO₂ emissions have been saved since 2005¹⁰.

¹⁰ See pages 18-20 of the Sustainable Aviation Progress Report 2015 <http://www.sustainableaviation.co.uk/wp-content/uploads/2015/12/SA-Progress-Report-2005-2015.pdf>

OPPORTUNITIES FROM SUSTAINABLE AVIATION FUELS

Airlines UK endorses the findings of Sustainable Aviation’s ‘Sustainable Fuels Road-Map’¹¹. This sets out the emerging opportunities to make jet fuel from new materials such as waste produced from domestic, commercial and industrial processes.

Environment Opportunities from using sustainable jet fuel instead of fossil based jet fuel



Realising the opportunities set out in the Road-Map would deliver the following benefits:

- Up to 24% reduction in CO₂ emissions from UK aviation by 2050
- UK Gross Value Added of up to £265 million and an export value of £220m in 2030
- Up to 12 UK operational sustainable fuel production facilities by 2030
- 3,400 direct jobs and a further 1,000 jobs in global exports

Currently, for safety reasons, sustainable jet fuel needs to be blended with fossil based jet fuel in current aircraft at 50% of each type. This does dilute the ability to achieve the full environment opportunities set out above, but as new aircraft are designed and introduced the amount of fuel blending required is expected to reduce.



TACKLING THE BARRIERS

The UK Government's support is vital to overcoming the barriers in producing and using sustainable jet fuel in the UK.

The barriers	The solutions
Higher cost of sustainable jet fuel compared to fossil based jet fuel	Include sustainable aviation fuel within the UK Renewable Transport Fuel Obligation
Cost of building new sustainable fuel production centres	A clear long-term policy from the Government encouraging UK sustainable aviation fuel production
Waste recycling policies limit or prohibit use of waste to make sustainable fuel	Review current waste recycling policies to optimise the opportunities from sustainable aviation fuel

The Renewable Transport Fuel Obligation (RTFO) encourages the production of sustainable fuels but it currently only applies to fuels produced for road transport. Under the RTFO suppliers of road transport and non-road mobile machinery (NRMM) fuel in the UK must be able to show that a percentage of the fuel they supply comes from renewable and sustainable sources. Suppliers of aviation fuel are not currently included in the RTFO. This means that there are no incentives for fuel producers to produce sustainable aviation fuels in the UK, unlike in the Netherlands or the US¹³ where they are included in similar schemes.

Airlines UK welcomes the UK Government's consultation launch in November 2016¹⁴ to look at the inclusion of Sustainable Aviation Fuels (SAF) within an updated renewable transport fuel policy. However, we are concerned that the updated policy must support all the wide ranging and innovative schemes to produce sustainable aviation fuels, including those being championed by our members. Airlines UK request that the UK Government act with urgency and implement the required legislation to avoid the UK from being left too far behind other countries in this area.

Airlines UK calls on the Government to provide a long-term policy for encouraging UK sustainable aviation fuel production that will help stimulate research, development and investment. The current absence of such a policy is creating a "too risky" barrier to investment in sustainable aviation fuels. Sustainable Aviation has been calling for the UK Government to establish a strategy and deliver support for sustainable aviation fuels since 2014. Airlines UK, like Sustainable Aviation, believe that without a long-term policy for UK sustainable aviation fuel production, investment in this sector will be limited and our innovations will lag behind other nations. The UK Government's Green Investment Bank for example could play an important role in helping the first commercial production plants to establish via grants, equity co-investment, loans and loan guarantees if encouraged by policy to do so.

MEASURES TO OFFSET CO₂ EMISSIONS

Once all the airline initiatives to cut CO₂ emissions have been exhausted, some form of carbon offsetting scheme will still be required to meet lower CO₂ emission goals. In the UK and Europe there is currently a carbon emissions trading scheme (EU ETS¹⁵), where carbon offset units are purchased for all flights which operate within the UK and Europe. This caps aviation at 95% of its 2005 CO₂ emissions and has resulted in a further reduction of six million tonnes of CO₂ from UK airlines since 2012. Some Airlines UK members also offer their passengers the opportunity to calculate their personal CO₂ emissions for each flight, and support low carbon projects in the UK or purchase carbon offsets directly when booking their flights.

Globally, airlines now have a target to cut CO₂ emissions from all flights by 50% of their 2005 levels by 2050. To achieve this, Governments, industry and civil society have worked with the International Civil Aviation Organisation (ICAO) to develop a carbon offsetting and reduction scheme for international aviation¹⁶ (CORSIA).

12 See <http://www.lowcvp.org.uk/projects/transport-energy-task-force.htm>

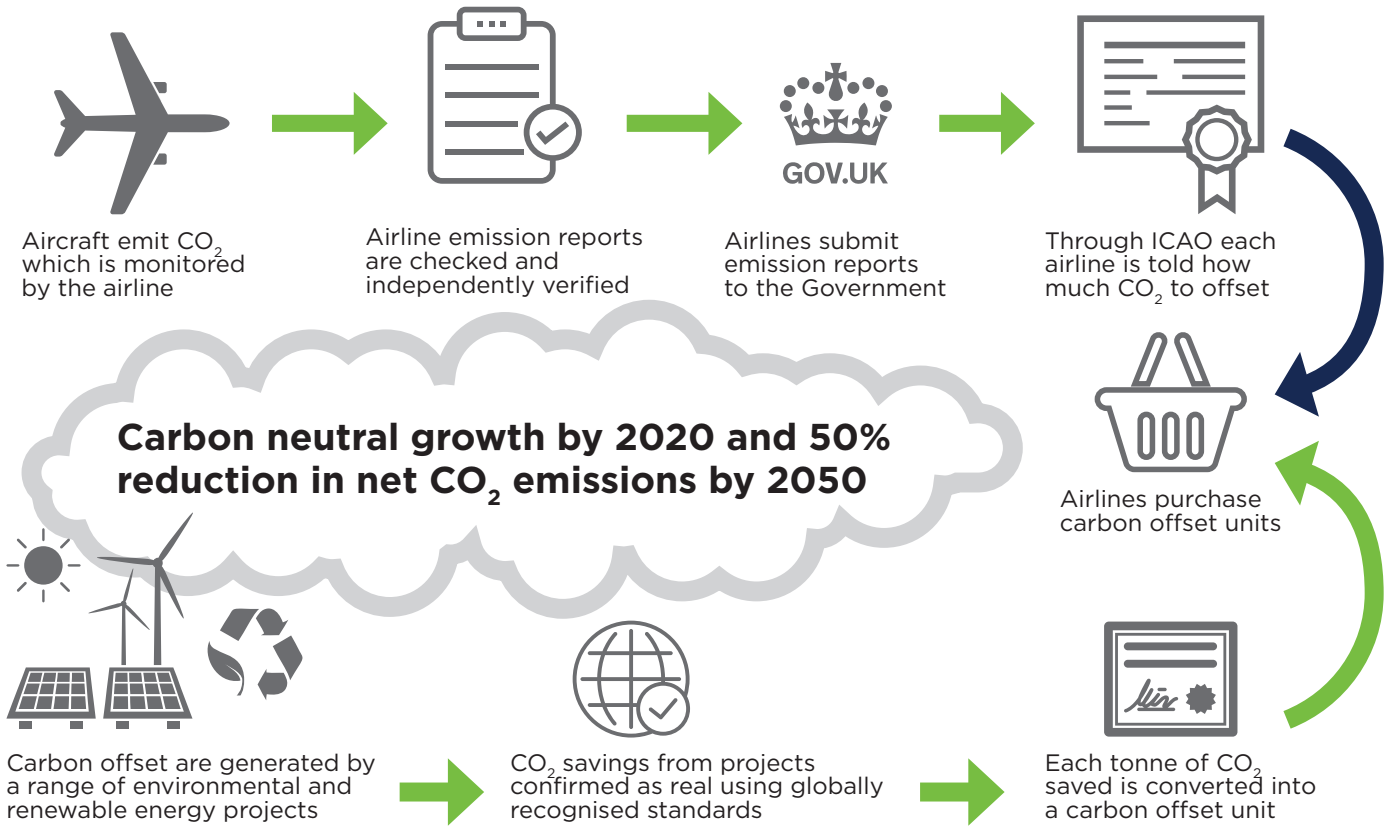
13 See <http://www.afdc.energy.gov/laws/RIN.html>

14 See <https://www.gov.uk/government/consultations/renewable-transport-fuel-obligation-proposed-changes-for-2017>

15 See http://ec.europa.eu/clima/policies/transport/aviation/index_en.htm

16 See http://www.icao.int/environmental-protection/Pages/A39_CORSA_FAQ2.aspx

HOW CORSIA IS LIKELY TO OPERATE



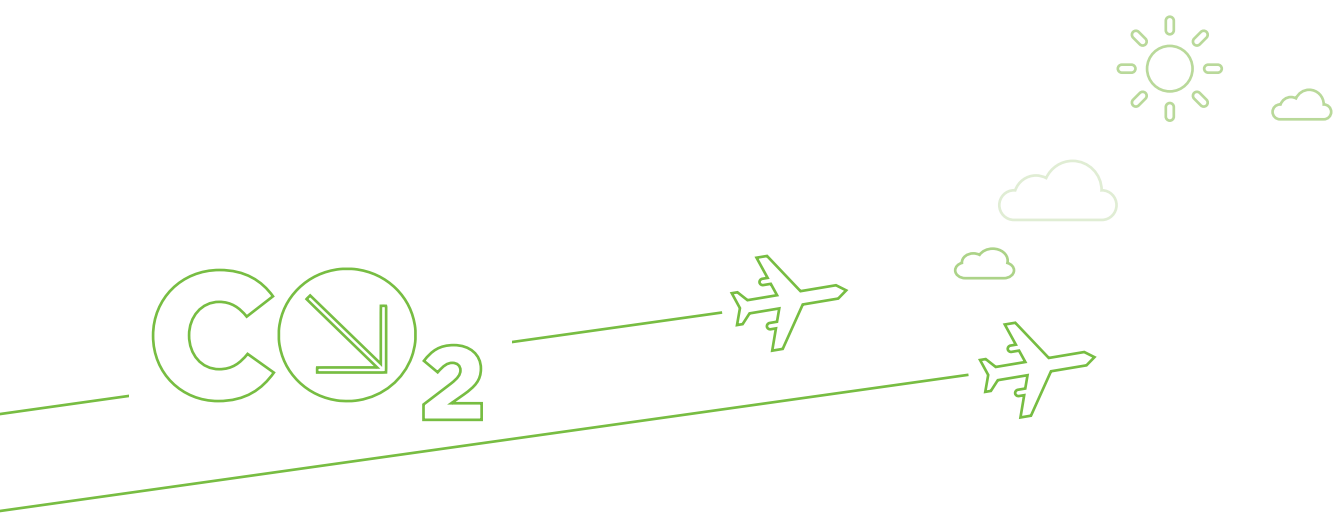
The first global aspiration goal for CORSIA is carbon neutral growth from 2020. In October 2016, 66 States, including Australia, Canada, China, the European Union, New Zealand, the United Arab Emirates, the UK and the United States (which together represent over 85% of air traffic) volunteered to be included in the scheme from the beginning¹⁷.

Airlines UK welcome the role played by the UK Government in negotiations towards agreeing ICAO’s CORSIA. The Government must now focus on the implementation details, particularly avoiding duplication with the coverage of this scheme and other regional schemes. The Government should also start negotiations with other countries to agree how CORSIA will deliver a halving of global airline net CO₂ reductions by 2050, whilst delivering economic growth.

AIRLINES UK CALLS ON THE GOVERNMENT TO:

- Prioritise and support industry efforts to deliver airspace modernisation as set out in the existing Civil Aviation Authority Future Airspace Strategy thereby delivering a potential carbon saving by 2050 of between 9% and 14%.
- Include airspace, as a critical part of the UK’s national infrastructure which requires long-term strategic decision making, in the remit of the National Infrastructure Commission.
- Deliver legislation for including all sustainable aviation fuel producers in the Renewable Transport Fuel Obligation.
- Provide a clear long-term policy to encourage UK sustainable aviation fuel production and use and delivering an 18-24% CO₂ reduction by 2050.
- Work with the industry to avoid duplication or competitive distortion for UK airlines between global and regional aviation carbon trading and offsetting schemes.
- Start negotiations with other countries to agree how the internationally agreed aviation CO₂ offsetting scheme will deliver a halving of global airline net CO₂ reductions by 2050.
- Continue to invest in and support the UK aerospace industry in its efforts to deliver affordable, new aircraft technology and grow the number of high value jobs in the UK.

¹⁷ See <http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx>



UK AIRLINES
**RESPONDING
TO THE CARBON
CHALLENGE**



airlinesuk.org