THE RIGHT FLIGHTPATH TO REDUCE AVIATION EMISSIONS

The aviation sector recognises the growing and urgent need for society to address the global challenge of climate change. It also emphasises that aviation plays a vital role in promoting sustainable development and should remain safe, affordable and accessible in order to ensure mobility on an equitable basis to all sectors of society.

The international community thus has a common responsibility to ensure that aviation can continue to deliver vital social and economic benefits, while addressing aircraft CO_2 emissions. The United Nation's specialised agency for aviation, the International Civil Aviation Organization (ICAO) must continue to play a leading role in efforts to limit and reduce aviation emissions. ICAO has the expertise and experience to deal with this unique sector of the economy and can build on knowledge developed through previous work that, among other things, has seen aviation become the safest form of travel on earth.

At the 37th ICAO Assembly in October 2010, governments reached a global agreement on a sectoral framework for addressing international aviation emissions. Being the first of its kind, the agreement formulates global targets for the sector, along with a set of principles for the use of economic measures, while taking into account the specific needs of developed and developing countries. COP17 in Durban presents a unique opportunity to build on the successful outcome of the 37th ICAO Assembly and further strengthen cooperation between governments and the aviation sector to jointly address the climate change challenge.

As early as 2007, the global aviation community adopted a four-pillar strategy, which promotes and drives efforts in four key areas: improved technology, efficient operations, effective infrastructure and positive economic measures. In 2009, the sector announced ambitious collective targets for aviation emissions reductions.

In the short term, between 2010 and 2020, aviation is committed to improve its fuel efficiency by an average of 1.5% per year, representing a further efficiency gain of 17% by 2020 or 2.2 billion tonnes of CO_2 savings. To achieve this, 12,000 new aircraft will have to enter service in this period, at a cost of $1.3 trillion to airlines. Furthermore, some infrastructure and air traffic management efficiency improvements are dependent on direct government investments over which the industry has little visibility and control.

From 2020, aviation will cap its net carbon emissions (through carbon neutral growth) and by 2050 it aims to halve its net emissions compared to 2005 levels.

The aviation sector is determined to be part of the solution but insists it cannot be held responsible for more than its fair share of emissions. Achieving its collective targets is therefore contingent upon other stakeholders - particularly governments - playing a responsible role as well.

A POSITION PAPER PRESENTED BY THE GLOBAL AVIATION INDUSTRY

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CARBON-NEUTRAL GROWTH TO BE ACHIEVED FROM 2020

In 2008, airlines, manufacturers, air navigation service providers and airports came together in Geneva and signed a commitment to a pathway to carbon-neutral growth.

Carbon neutral growth means that net CO_2 emissions from aviation would peak in 2020, stabilise and then decline after that, while accommodating increased air transport demand. To achieve carbon neutral growth from 2020, a multi-faceted approach is required with a strong commitment from all aviation stakeholders: aircraft operators, manufacturers, fuel suppliers, airports, and air navigation service providers working together through the four pillars of the aviation industry strategy outlined below.

Of the four pillars, **technology** has by far the best prospects for reducing aviation emissions. The industry is making great advances in technology such as: revolutionary new aircraft designs; new composite lightweight materials; radical new engine advances; and the development of sustainable alternative jet fuels which could reduce CO_2 emissions 80%, on a full carbon life-cycle basis. The sector is primarily focusing on biofuels from second generation sources such as algae, non-food crops and waste biomass.

These fuels can be produced sustainably to minimise impacts on food crops and fresh water usage. Tests flights have clearly demonstrated that the use of biofuel from these sources as "drop-in" fuels is safe and technically sound. Biofuels can be blended with existing jet fuel in increasing quantities as they become available.

Improved **operational** practices, including reduced auxiliary power unit usage, more efficient flight procedures, and weight reduction measures, could achieve further reductions in CO_2 emissions.

Infrastructure improvements present a major opportunity for CO_2 reductions in the near term. Initial estimates by the IPCC indicated 12% inefficiency in global air transport infrastructure. Since then 4% efficiencies have already been achieved. Full implementation of more efficient air traffic management and airport infrastructure could provide substantial emissions reductions through implementation of measures such as the Single European Sky and the Next Generation Air Traffic Management system in the USA.

While efforts from the first three pillars will go a long way to achieving the goal of carbon neutral growth from 2020, the aviation sector will need to turn to the fourth pillar – **smart economic measures** – to close the gap.

OUR CLIMATE TARGETS

1.5%

We will improve our fleet fuel efficiency by 1.5% per annum between now and 2020.

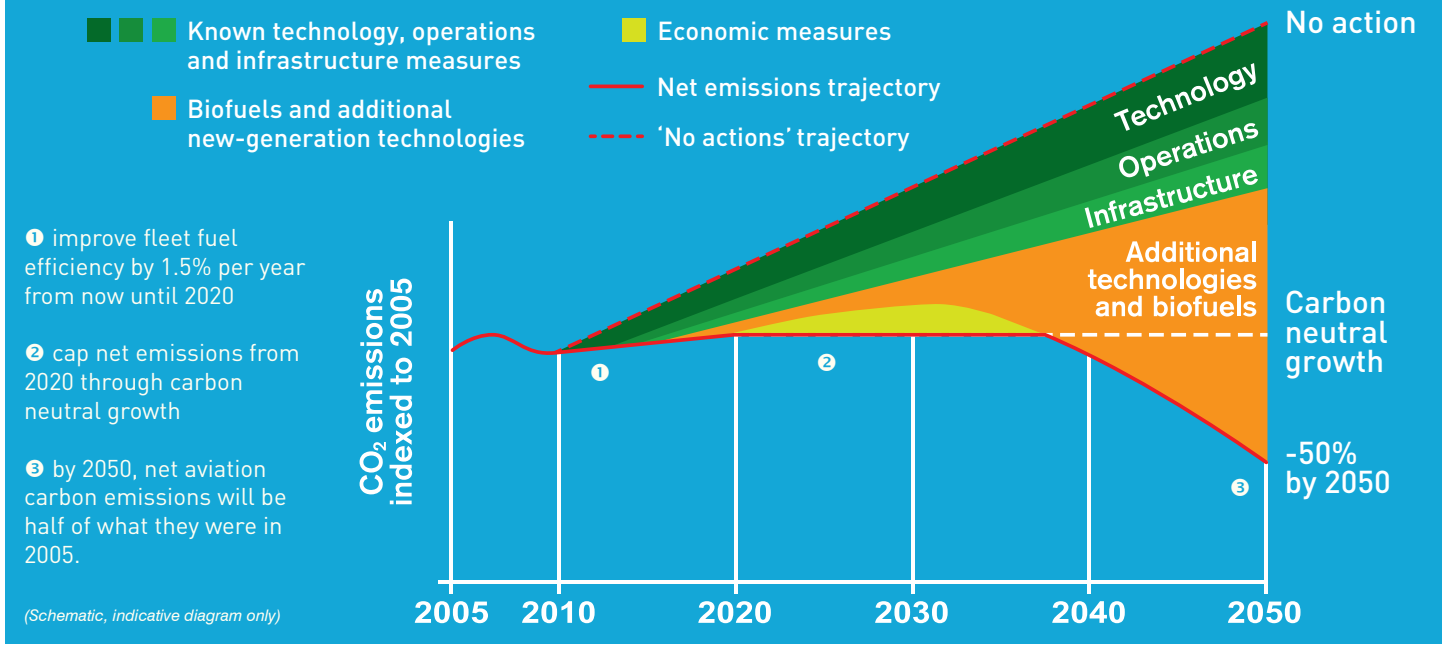
Stabilise

From 2020, net carbon emissions from aviation will be capped through carbon-neutral growth.

50%

By 2050, net aviation carbon emissions will be half of what they were in 2005.

MAPPING OUT THE INDUSTRY COMMITMENTS



A GLOBAL APPROACH FOR AVIATION

Aviation is the ultimate global activity: it provides an interconnected network of air services spanning the entire globe, with aircraft - and their emissions - crossing continents and national jurisdictions on a daily basis. Even flights that are purely within a State's boundaries can have implications for international aviation, as domestic flights often serve as critical feeders for the international network. To avoid a patchwork of overlapping and potentially conflicting national and regional policies, a framework for addressing CO_2 emissions from aviation must be developed at a global level.

Further, although aviation is a relatively homogenous sector in terms of technology and efficiency levels, it is also a highly competitive, R&D-intensive sector, largely characterised by low entry barriers, thin revenue margins and a high exposure to external shocks. Policy measures applied in other sectors may not necessarily translate to aviation. While the aviation sector has many characteristics that make the development of policy mechanisms to further reduce emissions more challenging than for other fossil fuel consuming sectors, it has an unparalleled record of CO_2 efficiency improvements.

Recognising the specific nature of the aviation sector, governments at the 37th ICAO Assembly (October 2010) demonstrated that multilateral collaborative action by all States through a global sectoral approach under ICAO is the most appropriate mechanism to effectively address international aviation emissions in a post-2012 framework.

To be effective, however, efforts to limit or reduce CO_2 emissions from aviation should address all parts of the aviation supply chain. In addition to aircraft operators this includes for example aircraft manufacturers, fuel suppliers, air navigation service providers and airports, who directly influence aviation's environmental performance through the design and deployment of the products and services they supply.

Lastly, governments have a responsibility to establish the right legal and fiscal frameworks to facilitate and increase investment in cost-effective CO_2 emissions reduction measures, including new aircraft and engine technologies, more efficient air traffic management infrastructure and low-carbon sustainable alternative jet fuels, and to enable the full and unrestricted access of the aviation sector to the global carbon market and use of available mitigation measures outside the sector.

RECOMMENDATIONS FOR INCLUDING AVIATION IN A GLOBAL CLIMATE CHANGE FRAMEWORK

The global aviation sector recommends:

1. Aircraft CO_2 emissions should be addressed as part of any post-2012 global climate change agreement, through the International Civil Aviation Organisation (ICAO).
2. Emissions from aviation should be addressed through ICAO adopting a global and comprehensive approach that does not distort competition amongst aircraft operators, treats aviation as one indivisible sector rather than by country.
3. Aviation emissions should be accounted for in a dedicated, global emissions inventory for the sector to reliably track progress against industry targets, avoid double counting and ensure emissions reductions are only paid for once.
4. The aviation industry can achieve carbon neutral growth from 2020 and work towards reducing aviation net carbon emissions by 50% in 2050, compared to 2005 levels. These ambitious targets are contingent upon governments providing necessary investments for:
    - modernisation of air traffic management
    - aerodynamic and operations technology research and development through academic and industry partners
    - development and commercialisation of sustainable, second-generation biofuels for use in aviation

For further information about the many ways the aviation industry is reducing its climate impact, check the cross-industry resource centre at **www.enviro.aero**

To arrange a briefing from an aviation industry representative at COP17, please contact **doddh@atag.org**

PROPOSED TARGETS AND GUIDING PRINCIPLES

ICAO is the appropriate United Nations body for setting and administering aviation-specific standards and targets to further address CO_2 emissions from aviation and for developing a global framework for aviation to address climate change. Following adoption of the groundbreaking ICAO Assembly resolution of October 2010, the aviation sector urges governments to support ICAO in the further development and implementation of this agreement.

In addition to the principles already agreed by governments at the ICAO 37th Assembly (see box next page), it is recommended that the further development of the global framework for aviation through ICAO reflects the following targets and guiding principles:

Targets - In line with aspirational goals already under discussion in ICAO, a mid-term target to stabilise net CO_2 emissions from aviation from 2020 onward (carbon-neutral growth), subject to critical aviation infrastructure and technology advances achieved by the industry and government, should be adopted.

A long-term aspirational goal would be to reduce aviation net carbon emissions by 50% in 2050, compared to 2005 levels.

Accounting for aviation emissions - Aviation CO_2 emissions should be accounted for in a dedicated global emissions inventory for the sector, not at a regional or national level. It is essential that emissions from aviation are accounted for only once, whether from domestic or international activities and that any market-based measures addressing aviation emissions are not duplicative. Above all fair competition must be ensured between aircraft operating on the same routes

Individual carrier responsibilities - Responsibility for meeting the collective industry CNG 2020 target should take into account each carrier's fuel efficiency performance. Each carrier has the option to decide what measures to use to reduce and/or mitigate its CO_2 emissions to meet its target, including fleet renewal, retrofits, operational improvements, sustainable alternative fuels, as well as certified carbon credits and potentially any tradable allowances obtained from the carbon markets.

Geographic coverage - Due to the global, interconnected nature of air transport, governments are encouraged to equally apply the parameters of a global framework to both domestic and international aviation emissions, without distinction.

Interdependencies of measures - The key CO_2 abatement opportunities for the aviation sector are the implementation of new technologies, including low fuel burn aircraft and engine technologies, alternative fuels with reduced life-cycle CO_2 emissions, and ongoing improvements in operational efficiency and air traffic management systems and processes. While the aviation sector continues to explore and exploit the full range of available abatement opportunities, it is important to consider the interrelationships between the various mitigation measures. For example, some actions such as changing preferred runway usage and reducing flightpath lengths near airports can adversely affect noise management procedures. Therefore regulators, when formulating actions to address CO_2 emissions from aviation, must carefully consider and balance the overall possible impacts of such actions.

But whatever the approach, all adopted measures should be technologically feasible, economically reasonable, socially responsible and environmentally beneficial.

The aviation sector believes that ICAO is uniquely qualified to provide guidance and technical expertise to develop CO_2 mitigation measures and ensure that they do not adversely impact on other sensitive aviation areas such as noise and local air quality.

MEASURES TO ADDRESS AVIATION EMISSIONS MUST BE GLOBAL

Unilateral response measures are not useful

The safe, orderly and efficient functioning of today's international air transport system relies on the adoption of commonly agreed standards, rules and regulations. The use of unilateral measures, regulating foreign operators without the consent of their governments, critically undermines this foundation. It also puts aviation at risk of being caught in a web of uncoordinated, costly and ineffective measures and counter-measures imposed by governments, which will benefit no one but may harm economies and environments worldwide.

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For more information:
www.atag.org

Cost-effective economic measures - Economic measures to address CO_2 emissions from aviation must be cost-effective and non-duplicative, while minimising market distortions. These measures, developed through ICAO, should be transparent, administratively simple and implemented on the basis of consensus. They should also provide full and open access to the global carbon market and recognise past and future achievements and investments in aviation fuel efficiency and in other measures to reduce aviation emissions. The aviation industry reiterates that economic measures should not impose an inappropriate economic burden on aviation. Taxes, levies and charges targeted at air transport are environmentally ineffective and severely undermine the sector's ability to invest in further emissions reduction technology, operations and infrastructure measures.

Use of revenues - Any eventual revenues from economic measures under a global framework to address aviation emissions should be clearly earmarked for aviation and environmental purposes. Such revenues should be prioritised for re-investment in additional, cost-effective measures to further improve the emissions profile of aviation, for instance by supporting the development and deployment of more fuel-efficient aircraft, engines, infrastructure, low carbon sustainable jet fuels and investment in air traffic management technologies. Part of such revenues could be set aside for carbon offset projects within the sector.

Use of carbon market instruments - For a global approach for aviation to be effective it must have an open architecture, i.e. aviation should have unrestricted access to carbon market instruments to meet its obligations, on a par with other sectors. The full integration of aviation sector CO_2 emissions in the global emissions inventory should make this possible.

Administration - Effective administration of a global framework requires implementation, management and oversight of the following processes: target setting, CO_2 monitoring and reporting, compliance and enforcement. Administration should be undertaken by the organisation(s) able to do so in the most efficient and cost-effective manner and could involve both government and industry bodies. As the designated United Nations body for international aviation, ICAO should have a central oversight role in this process. As is currently already the case with regard to aviation noise and non-CO_2 emissions, ICAO should create and maintain a robust aviation CO_2 emissions inventory, available on an equal access basis.

Special needs of developing countries - The 37th ICAO Assembly, held in October 2010, demonstrated that political leadership can produce innovative solutions to recognise and accommodate states with special needs that have difficulty complying with standards or recommended practices. The de minimis provisions of the Assembly resolution should be respected and the threshold and its potential impacts on the aviation industry and markets must be kept under regular review.

ICAO PRINCIPLES FOR MARKET-BASED MEASURES

The guiding principles for the design and implementation of market-based measures (MBMs) for international aviation, adopted at the 37th ICAO Assembly, Resolution 37-19:

a) MBMs should support sustainable development of the international aviation sector;
b) MBMs should support the mitigation of GHG emissions from international aviation;
c) MBMs should contribute towards achieving global aspirational goals;
d) MBMs should be transparent and administratively simple;
e) MBMs should be cost-effective;
f) MBMs should not be duplicative and international aviation CO_2 emissions should be accounted for only once;
g) MBMs should minimise carbon leakage and market distortions;
h) MBMs should ensure the fair treatment of the international aviation sector in relation to other sectors;
i) MBMs should recognise past and future achievements and investments in aviation fuel efficiency and in other measures to reduce aviation emissions;
j) MBMs should not impose inappropriate economic burden on international aviation;
k) MBMs should facilitate appropriate access to all carbon markets;
l) MBMs should be assessed in relation to various measures on the basis of performance measured in terms of CO_2 emissions reductions or avoidance, where appropriate;
m) MBMs should include de minimis provisions;
n) where revenues are generated from MBMs, it is strongly recommended that they should be applied in the first instance to mitigating the environmental impact of aircraft engine emissions, including mitigation and adaptation, as well as assistance to and support for developing States; and
o) where emissions reductions are achieved through MBMs, they should be identified in States' emissions reporting.

2%

In 2010, the global aviation industry produced **649 million tonnes** of carbon dioxide. This is **2%** of the global total of over 34 billion tonnes produced by humans.

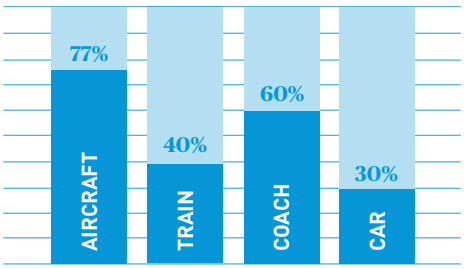
Source: IATA Economics / IPCC, 2007

If aviation were a country, it would rank **21st in the world** in terms of gross domestic product (GDP), generating $425 billion of GDP per year, considerably larger than some members of the G20 (and around the same size as Switzerland). By 2026, it is forecast that aviation will contribute **$1 trillion to world GDP**.

Source: Oxford Economics, Aviation: the Real World Wide Web, 2009

77%

Globally, the average occupancy of aircraft is around 77%, greater than other forms of transport.



Figures for aircraft are worldwide. Figures for other modes are UK averages.

80%

Alternative fuels, particularly sustainable biofuels, have been identified as excellent candidates for helping achieve the industry targets. Biofuels derived from biomass such as algae, jatropha and camelina have been shown to reduce the carbon footprint of aviation fuel by **up to 80% over their full lifecycle**.

Source: ATAG, the Beginner's Guide to Aviation Biofuels / Sustainable Oils and Honeywell UOP analysis

2.6 billion

2010: over **2.6 billion passengers** were carried by the world's airlines.

Source: IATA Economics

80%

Around 80% of aviation CO_2 is emitted from flights of **over 1,500 kilometres**, for which there is no practical alternative mode of transport.

Source: IATA Economics

35%

While air transport carries around 0.5% of the volume of world trade shipments, it is **over 35% by value** – meaning that goods shipped by air are very high value commodities, often times perishable or time-sensitive. Deliveries of fresh produce from Africa to the UK alone **supports the livelihoods of 1.5 million people**, while producing less CO_2 than similar produce grown in the UK, despite the energy used in transport.

Source: Oxford Economics, Aviation: the Real World Wide Web, 2009

Over **33 million people** are employed worldwide in aviation activities and related tourism. Of this, 5.5 million people work directly in the aviation industry.

Source: Oxford Economics, Aviation: the Real World Wide Web, 2009

70%

A jet aircraft coming off the production line today is over **70% more fuel efficient** per passenger seat kilometre than one delivered in the 1960s.

Source: ATAG Beginner's Guide to Aviation Efficiency

3 litres

The new Airbus A380, Boeing 787 and Bombardier CSeries aircraft use **less than 3 litres of jet fuel per 100 passenger kilometres**. This matches the efficiency of most modern compact cars.

Source: Manufacturers

Aviation

1,715 airlines operate a fleet of **23,000 aircraft** serving **3,750 airports** through a route network of millions of kilometres managed by **160 air navigation service providers**.

Source: Oxford Economics, 2009

AN INDUSTRY UNITED

This paper was developed by the following organisations, representing the combined global commercial aviation sector, and coordinated by the **Air Transport Action Group**:

- **Airports Council International**, representing over 1600 airports serving 95% of the world's passengers.
- **Civil Air Navigation Services Organisation**, representing 54 air navigation service providers, serving over 85% of global air traffic.
- **International Air Transport Association**, representing 230 airlines, flying 93% of scheduled international air traffic.
- **International Coordinating Council of Aerospace Industries Associations**, representing global commercial aircraft and engine manufacturers.
- **International Business Aviation Council**, representing over 8,500 companies operating in the global business aviation community.