A global approach to reducing aviation emissions

First stop: carbon-neutral growth from 2020

FOREWORD

Environmental responsibility is nothing new for the aviation industry. Well before the Kyoto Protocol the industry was working hard to reduce its emissions. This has borne fruit – over the past 40 years our industry has improved fuel efficiency 70%. Between 2001 and 2008 alone we improved fuel efficiency 16%. But in the past few years we have been raising the bar even higher.

At the IATA annual general meeting in 2007 I laid out a vision for the industry – to achieve carbon-neutral growth in the mid-term and to build a zero emission commercial aircraft within the next 50 years. This would be achieved through the IATA four-pillar strategy to reduce emissions: investment in technology; effective operations; efficient infrastructure and positive economic instruments.

Since 2007 we have made significant progress. Aviation emissions fell from 671 million tonnes of CO_2 in 2007 to 666 million tonnes of CO_2 in 2008. For 2009 we are forecasting a further fall of 6.5% to 623 million tonnes of CO_2. The fall in emissions is partly the result of the economic downturn but it is partly due to efficiencies achieved under the four-pillar strategy. Our Green Teams saved airlines almost 11 million tonnes of CO_2 in 2008 and infrastructure improvements saved a further 4 million tonnes.

At IATA's annual general meeting in June 2009, we agreed new and ambitious targets for emissions reduction. These collective targets have been endorsed by the whole aviation industry. We committed to stop the growth of our emissions from 2020 and to halve emissions by 2050 compared to 2005 levels. No other industry has made such commitments at a global level.

To achieve these targets the industry needs an effective approach to emission reduction by governments. The carbon-neutral growth target can only be met if the industry and governments jointly achieve infrastructure and technology advances. We must work hand-in-hand to create the right framework. The support by G8 leaders in July 2009 for a global sectoral approach in dealing with aviation emissions is a good start. In December 2009 governments will meet in Copenhagen to discuss a successor treaty to the Kyoto Protocol. As part of the new protocol, governments must reach a global agreement on aviation emissions.

In this document we explain our strategy and targets in more detail and we describe how governments could work with us to meet the global challenge of climate change in a timely and effective manner.

Giovanni Bisignani
Director General and CEO

A VISION FOR THE FUTURE

In June 2007 IATA laid out its environmental vision to mitigate greenhouse gas emissions from aviation:

- Build a zero-emissions commercial aircraft within 50 years
- Adopt a four-pillar strategy to achieve this vision:
  1. Improved technology
  2. Effective operations
  3. Efficient infrastructure
  4. Positive economic measures

The four-pillar strategy was adopted by the global aviation industry, as well as ICAO states, in 2007.

In June 2009, IATA airlines took a landmark decision to adopt a set of ambitious targets:

- A cap on aviation CO_2 emissions from 2020 (carbon-neutral growth)
- An average improvement in fuel efficiency of 1.5% per year from 2009 to 2020
- A reduction in CO_2 emissions of 50% by 2050, relative to 2005 levels

These collective goals were endorsed by the aviation industry in the joint industry submission to ICAO in September 2009.

What are we asking governments to do?

Governments have an important role to play in helping the industry reduce its emissions. Below are some of the measures that we are asking governments to take:

- Ensure international aviation is included in the post-Kyoto framework
- Work through ICAO and UNFCCC to adopt a global sectoral approach for aviation that does not distort competition amongst airlines
  - > Treat aviation as one indivisible sector rather than by country
  - > Take a global approach to emissions reduction
  - > Approach should apply equally to both domestic and international aviation emissions
- Allow full and unrestricted access
  - > To all available abatement measures outside the aviation sector (offsets)
  - > To carbon markets
- Ensure that emissions are accounted for just once
- Avoid duplication of economic measures
- Revenues from economic measures such as emissions permit auctions must go back into environmental measures
- All airlines/carriers must be treated equally
- Reconcile common but differentiated approach for countries with equal treatment for airlines
- Adopt cost-effective economic measures that help the environment, not punitive measures that do not
- Help with research into more fuel efficient technology
- Provide incentives for fleet renewal with more fuel efficient aircraft
- Establish the right legal and fiscal frameworks to promote investment in low carbon sustainable alternative jet fuels
- Make the necessary investments to modernize air traffic management
- Regulatory efforts to reduce aviation emissions should address all parts of the aviation supply chain

Carbon-Neutral Growth from 2020:
IATA'S FOUR-PILLAR STRATEGY

How will we achieve carbon-neutral growth (CNG) from 2020 on the way to a carbon free future? Carbon-neutral growth means that aviation's net CO_2 emissions stop growing, even when demand for air transport continues to grow. In other words, net CO_2 emissions from aviation would peak from 2020 and would decline after that. CNG will be achieved by investing in measures to cut emissions within the industry or by financing projects to cut an equivalent amount of emissions in other industries.

To achieve it, a multi-faceted approach is required with a strong commitment from all aviation stakeholders: airlines, manufacturers, fuel suppliers, airports, and air navigation service providers. The need for the airline industry to continue to have the capacity to invest in emissions mitigation measures must be central to any approach. The IATA four pillar strategy provides the building blocks to achieve IATA's goals and vision.

Pillar 1 – technology

Of the four pillars, technology has the best prospects for reducing aviation emissions. The industry is making great advances in technology such as: revolutionary new plane designs; new composite lightweight materials; radical new engine advances; and the development of biofuels. Airlines will spend $1.5 trillion on new aircraft by 2020. Some 5,500 aircraft will be replaced by 2020, or 27% of the total fleet resulting in a 21% reduction in CO_2 emissions compared to business as usual.

Technology Roadmap – IATA's Technology Roadmap identifies future technologies that could reduce emissions 20 to 35% per aircraft. It provides an overview of aircraft, engine and system technologies that help reduce fuel burn and carbon emissions. It covers steps that are being taken right now such as retrofitting winglets, as well as a range of more innovative technologies, including new engine architecture, composite materials and laminar flow. Modifications to the existing fleet using current technologies (winglets, drag reduction, etc.) could achieve an extra 1% overall emissions reduction by 2020 for an estimated investment of $2 billion. But implementing the new technologies identified in the roadmap could provide even bigger savings with fuel burn reductions of 20 to 35% per aircraft.

Timelines and examples of technologies	Impact
Retrofits	**7-13%**
▪ Winglets mounted on the wingtips of aircraft improve aerodynamics and reduce fuel burn ▪ More advanced engine components for better combustion and airflow ▪ Lighter materials for furnishing in the cabin ▪ Less energy-consuming lighting and in-flight entertainment	
Production Updates	**7-18%**
▪ More airframe structure components made of lightweight composite material instead of aluminium ▪ Advanced engines for current aircraft production series	
New aircraft design before 2020	**25-35%**
▪ Geared turbofan engine will reduce fuel burn 10-15% ▪ Open rotor engine will reduce fuel burn around 25% ▪ Counter-rotating fan will reduce fuel burn 10-15% ▪ Advanced turbofan will reduce fuel burn around 15% ▪ Laminar flow reduces aerodynamic drag by reducing turbulence on aircraft surface, 10-15% less fuel burn	
New aircraft design after 2020	**25-50%**
▪ Blended wing body, rather than the classical tube-and-wing architecture ▪ Revolutionary engine architectures ▪ Fuel cell system for on-board energy	

Biofuels – Sustainable biofuels for aviation could reduce CO_2 emissions 80%, on a full carbon life-cycle basis. IATA's focus is on biofuels sourced from second or new generation (e.g. algae, jatropha, camelina) biomass. These fuels can be produced sustainably to minimize impacts on food crops and fresh water usage.

Tests in 2008 and 2009 demonstrated that the use of biofuel from these sources as "drop-in" fuels is technically sound. No major adaptation of aircraft is required. Biofuels can be blended with existing jet fuel in increasing quantities as they become available. Assuming availability of a 6% mix of 2nd generation (sustainable) biofuels by 2020, this would reduce aviation CO_2 emissions by a further 5%, requiring

investment of $100 billion. IATA has set a target to be using 10% alternative fuels by 2017.

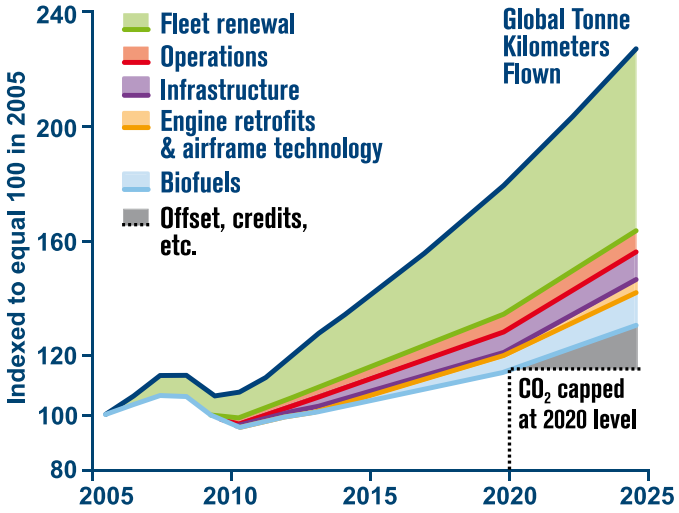
Pillar 2 – operations

More efficient aircraft operations can save fuel and CO_2 emissions. The Intergovernmental Panel on Climate Change's 1999 report identified 6% inefficiency in aircraft operations. Since 2005 IATA's Green Teams have worked hard with airlines to reduce this inefficiency. IATA's Green Teams consist of experts that visit airlines and advise them on fuel and emissions savings measures and best practice. Improved operational practices, including reduced APU (auxiliary power unit) usage, more efficient flight procedures, and weight reduction measures, will achieve 3% emissions reductions by 2020. In 2008 IATA's Green Teams saved 11 million tonnes of CO_2.

Pillar 3 – infrastructure

Infrastructure improvements present a major opportunity for fuel and CO_2 reductions in the near term. The Intergovernmental Panel on Climate Change estimated in 1999 that there was 12% inefficiency in air transport infrastructure. Since then 4% efficiencies have been achieved but there is still some way to go. Full implementation of more efficient ATM (Air Traffic Management) and airport infrastructure could provide an additional 4% emissions reduction by 2020. Measures include implementation of the Single European Sky (SESAR) which would produce a 70% cut in route extension; the Next Generation Air Traffic Management system in the USA which would lead to a 57% reduction in delays; reorganization of the Pearl River Delta ATM system in Hong Kong, RVSM (reduced vertical separation minima) over Russia, and flex tracks. These would require investments of $58 billion.

In 2008 IATA's work with industry partners resulted in 214 en route and 103 airport domain improvements for annual fuel savings that equate to 4 million tonnes of CO_2. IATA has identified 121 en-route and 40 airport improvements, for implementation in 2009. These include airspace improvements based on Performance-Based Navigation



(PBN) and Continuous Descent Arrival (CDA). Using CDA rather than the traditional stepped approach to landing can save up to 630 kg of CO_2 per landing. The CDA Action Plan initiated by IATA and other partners will save 500,000 tonnes of CO_2 through implementing CDA at 100 airports across Europe by the end of 2013.

Pillar 4 – economic measures

Economic measures can 'plug the gap'

While efforts from the first three pillars will go a long way to achieving the goal of carbon-neutral growth from 2020, it won't be quite enough, at least not initially. To 'close the gap', we will need to deploy the fourth pillar – economic measures. 90 million tonnes of CO_2 will need to be offset in 2025 to maintain emissions at 2020 levels and thus achieve carbon-neutral growth. By 2025, this will cost an additional $7 billion per year to achieve. Overall, this puts the airline capital expenditure for achieving carbon-neutral growth from 2020 at $1.6 trillion. The industry is advocating a global sectoral approach to reducing emissions.

A GLOBAL SECTORAL APPROACH

Why must aviation be treated as a sector?

Aviation is a global industry. For a typical flight, CO_2 will be emitted over several different countries and over international waters and even different continents. While it is relatively simple for governments to account for emissions from fixed sources within their borders, it is very difficult to do this with mobile sources such as international aviation, particularly when emissions occur outside their borders. Article 2.2 of the Kyoto Protocol recognized this by directing States to address emissions from international aviation through the UN's International Civil Aviation Organization (ICAO) rather than including them in national emission inventories.

Aviation should be treated as a separate sector. Its emissions should be accounted for at a global level, not by state. Unfortunately different governments seek to treat aviation emissions differently and this will lead to a patchwork of conflicting and potentially overlapping national and regional policies. We therefore urge governments to confirm the existing global sectoral approach to aviation under the post-Kyoto framework.

What would a global sectoral approach cover?

Any scheme should cover all CO_2 emissions from aircraft at this stage, consistent with the Kyoto Protocol. Once more is known about the non-CO_2 impacts of aviation, a policy on these impacts could be developed.

How would a global sectoral approach work?

The system must be simple and straightforward to operate. Administration of a global sectoral approach for aviation should be undertaken by the organization that is able to do so in the most efficient and cost-effective manner. In light of the unique characteristics of international aviation, the airline industry believes that ICAO is the appropriate UN body for developing and implementing a global sectoral approach to address aviation emissions. Compliance must be enforceable through an appropriate legal structure.

One of the issues that governments will need to tackle is how to reconcile the UNFCCC principle of Common But Differentiated Responsibilities (CBDR) for countries, with the requirement of equal treatment of aircraft operators laid down in Article 11 of the Chicago Convention. The industry believes that, with some political leadership and innovative solutions, the principles of equal treatment between airlines and differentiated responsibilities for States are completely consistent in the context of international aviation.

ICAO has traditionally recognized and accommodated states with special needs that have difficulty complying with standards or recommended practices, either through technical and financial support or via differentiated timelines for implementation of measures. A global sectoral approach is the best way of achieving this.

Cost-effective economic measures

Economic measures to address greenhouse gas emissions from aviation must be cost-effective and non-discriminatory. These measures could include emissions trading, carbon funds, offsets or other similar mechanisms. Economic measures must not create 'carbon leakage' where emissions transfer between countries or carriers leading to market distortions without reducing emissions.

Paying just once for emissions

The aviation industry should be held accountable and pay only once for its emissions, whether from international or domestic flights. Any emissions-related measures should result in credits for their contribution to achieving the sectoral targets for reducing the industry's global CO_2 emissions.

The global approach must replace any national or regional schemes such as the European Union Emissions Trading Scheme (ETS) or national environmental taxes on aviation such as the UK's Air Passenger Duty. Otherwise, the same emissions could be charged for several times over.

Emissions trading

One approach to reducing emissions is emissions trading, whereby each entity in an emissions trading scheme can choose the least costly option to meet its emissions quota. It can lower its production, improve its energy efficiency, or buy extra allowances from other entities that emit less than their quota. Thus the buyer is paying to emit more, while the seller is paid for having reduced its emissions. For a sectoral approach for aviation to be effective any emissions trading scheme must have an open architecture, i.e. aviation should have full and unrestricted access to carbon market instruments to meet its obligations, on a par with other sectors. The inclusion of aviation emissions in the overall post-Kyoto framework, accompanied by specific reduction targets, should make this possible.

Use of revenues

Any revenues from the economic measures under a global scheme to address aviation emissions should be earmarked for environmental purposes. A proportion of such revenues should be re-invested in additional measures to improve the emissions profile of aviation, for instance by supporting the development and deployment of more fuel-efficient aircraft and sustainable low carbon jet fuels. The balance of such revenues may be used to acquire certified emission reductions from recognized climate mitigation and adaptation projects, provided that the credits are counted towards achieving aviation's sectoral CO_2 reduction targets.

IATA (The International Air Transport Association) represents 230 international member airlines in 125 countries. In an industry that safely flies over 2 billion passengers a year, IATA's members carry 93% of the world's scheduled international air traffic. We represent, lead and serve the airline industry in a wide variety of fields.

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