



INTERNATIONAL CIVIL AVIATION ORGANIZATION

# Planetary Priorities

**ICAO and aviation stakeholders weigh-in on our best options for a sustainable air transport future**

## In this issue:

Jane Hupe: COP15 overview • John Begin: GIACC • Yvo de Boer: UNFCCC  
IATA and the ENV • CANSO ENV activity • UNEP viewpoint • Airbus ENV action  
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SWAFEA perspective • World ENV Day • State profile: Dominican Republic



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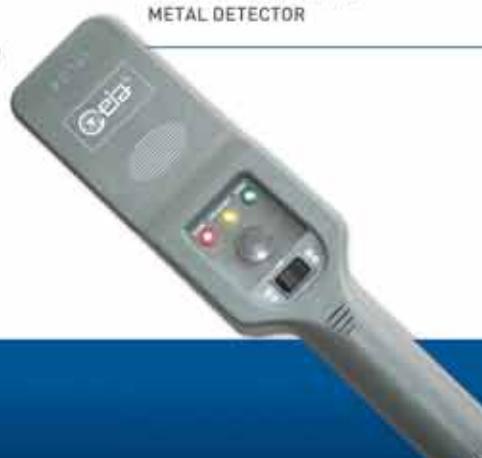
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THE ICAO JOURNAL  
VOLUME 64, NUMBER 5, 2009

**Editorial**

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The *Journal* encourages submissions from interested individuals, organizations and States wishing to share updates, perspectives or analysis related to global civil aviation. For further information on submission deadlines and planned issue topics for future editions of the *ICAO Journal*, please forward your request to [info@philbin.ca](mailto:info@philbin.ca).

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Published in Montreal, Canada. ISSN 0018 8778.

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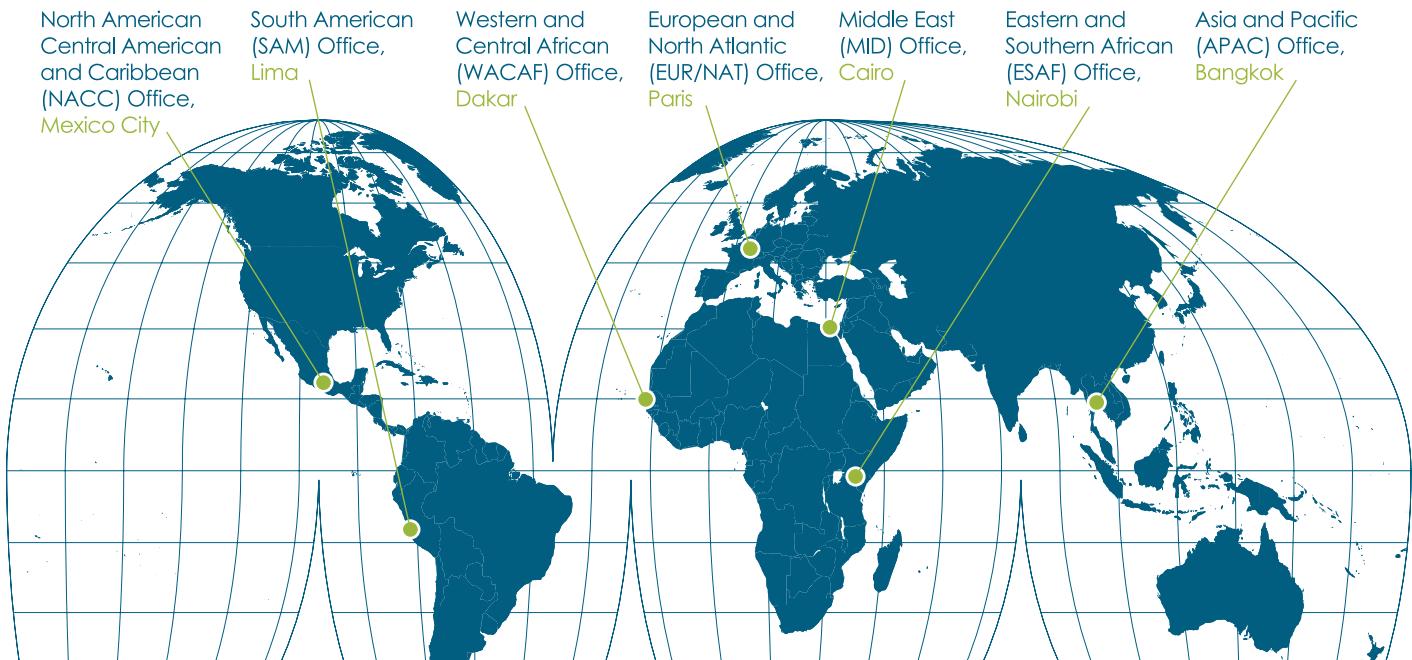
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## ICAO's Global Presence





# Effective Global Leadership Through Balanced Priorities



# ICAO's way forward to COP15

**As the UN body responsible for international aviation, ICAO will be expected to deliver concrete proposals to the upcoming COP15 with respect to how international aviation emissions should be treated under any new global climate change agreement.**

**Jane Hupe, Chief of the ICAO Environment Section, outlines here for the *ICAO Journal* the background to COP15, the Organization's role in helping aviation to become over 70 percent more fuel efficient in the past 40 years, the new proposal for addressing aviation emissions under consideration, and how the role of ICAO in facilitating agreement among States and the aviation community in this area has never been so important.**



The scientific community has, on several occasions, warned that climate change could pose a severe threat to life on our planet as we know it. These warnings have led to global cooperation efforts such as the Rio Earth Summit in 1992 and Kyoto in 1997, as well as governance breakthroughs such as the agreement on the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol.

This year, the world's attention turns once again to the UNFCCC in the hope that the international community will reach a new forward-looking and far-reaching global agreement on combating climate change. Such an agreement is expected to be the outcome of the upcoming UNFCCC meeting in December 2009 in Copenhagen, Denmark. Parties under the UNFCCC have now entered into full negotiating mode but the challenges of arriving at an

agreement in December should not be underestimated.

The treatment of emissions of greenhouse gases (GHGs) from international aviation is one of the many contentious issues on the UNFCCC agenda. The Kyoto Protocol, while including domestic aviation within the Annex I Parties' emissions reduction commitments, excluded international aviation emissions from their coverage due to the complexities of addressing emissions that are not confined within specific national boundaries. The same applies for emissions from international shipping. Such emissions from international aviation and maritime transport are usually referred to as 'emissions from bunker fuels.'

The main issues underlying the discussions on emissions from bunker fuels are the pace of growth experienced by both transportation modes, as well as the need to establish a goal for their reduction in the future under a globally accepted, sustainable path forward.

The options that are currently proposed for the consideration of governments under the UNFCCC process are focused on:

- The mitigation of emissions (i.e. the level of any reduction targets).
- The specific roles of UN bodies as regards the management and accounting of these emissions.
- Financing aspects including the introduction of taxes/levies in order to raise resources that could be used to fund action on mitigation and adaptation, particularly in developing countries.

All eyes are now turned to ICAO, as the UN body responsible for international aviation, to deliver concrete input to COP15 on how international aviation emissions should be treated in the new agreement. The Organization's goal is primarily to ensure that States will be provided with sound information regarding the assessment of current

and future aviation emissions and the policy options available to address them, so that decisions will be taken on solid grounds.

ICAO, building upon 40 years of experience on setting policies, Standards and Recommended Practices (SARPs) on aviation and the environment, has already set in motion a specific strategy to respond to this challenge. It established a special group to prepare the *Programme of Action on Aviation*

of *limiting or reducing the impact of aviation GHGs emissions on the global climate* (*36<sup>th</sup> ICAO Assembly, 2007*, Resolution A36-22, Appendix A), however, different views remained regarding the reduction levels and means to achieve this objective.

The 36<sup>th</sup> Session of the Assembly therefore decided to establish a specific process to resolve this issue, which included the formation of the Group on International Aviation and Climate

**"With all options still on the table, the window of opportunity to establish a meaningful framework to address emissions from international aviation is wider than ever. The role of ICAO in facilitating discussions among States and the aviation community has therefore never been so important."**

*and Climate Change* and will be holding a High-Level Meeting on International Aviation and Climate Change (October 2009) prior to COP15. The October meeting will facilitate dialogue and agreement on a *global* approach to a sustainable aviation future.

#### **Addressing emissions from international aviation**

ICAO has long been active in the development of measures to address international aviation emissions. These have led to operations today being 70 percent more fuel efficient than 40 years ago. However, the substantial growth of aviation over the same period, largely as a result of the important economic and social benefits it brings to States, has meant that aggregate emissions have outpaced any incremental achievements. It is therefore important that an agreement be reached on how to address the future growth of aviation emissions if the sustainability of the sector is to be achieved.

ICAO's 190 Parties have agreed on a longstanding environmental objective

Change (GIACC) and a clear mandate for it to develop an *ICAO Programme of Action on International Aviation and Climate Change* (for more on GIACC please see pages 13 and 31). The Assembly recommended that the work of the group should focus on aspirational goals and that these should be based on consensus.

The core issue in setting a global approach for emissions from international aviation is how to reconcile two basic principles: non-discrimination (equal treatment); and the common but differentiated responsibilities and respective capabilities enshrined respectively in the *Convention on International Civil Aviation* and the UNFCCC.

ICAO was given a mandate from its 190 Member States to address all issues related to international civil aviation, including its GHG emissions. The ultimate objective of the UNFCCC, as agreed by its 192 Parties (which are basically the same as those in ICAO), is to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference

with the climate system. Any action on international civil aviation therefore needs to take into account the complementarities of mandates and roles of both bodies and the legal aspects implied. Cooperation between these two bodies and the coordination of positions from Parties in ICAO and UNFCCC meetings are therefore fundamental to enable a global solution in this area.

The international aviation sector is providing a crucial service to the world by improving global mobility, bringing people in different parts of the world closer together, and by ensuring the movement of much needed goods and merchandise around the globe. The sector is responsible for the movement of 2.3 billion people and 40 million tonnes of goods per year, while providing employment for 33 million people<sup>1</sup> and contributing \$1.5 trillion<sup>2</sup> to the global GDP.

Despite the global benefits of the sector, the exclusion of its GHG emissions from the targets established under the UNFCCC and its Kyoto protocol has led to various perceptions regarding the current and future impact of international aviation on climate change. One key misperception relates to the level of emissions from international aviation and their contribution to climate change.

Following a request by ICAO, the IPCC developed the 1999 *Special Report on Aviation and the Global Atmosphere*, the first IPCC sectoral assessment. Further assessments, including the latest available scientific information that has been published in the Nobel Peace prize-winning IPCC *Fourth Assessment Report*, established that aviation as a whole is responsible for two percent of global anthropogenic CO<sub>2</sub> emissions. International aviation is estimated to be responsible for about two-thirds of this amount, or approximately 1.3 percent of total global anthropogenic CO<sub>2</sub> emissions.

Related concerns are the growth observed in the sector's emissions over

**"In undertaking all these efforts, ICAO is ensuring that it will be cooperating in the most effective manner possible with the process leading to a successful new climate agreement; one that builds upon the strengths of those involved and that targets an environmentally-sustainable response as its legacy to future generations."**

the last 50 years and the projected emissions levels should no action be taken. Such concerns are fuelled by the links between the growth of the emissions, a growing world economy and more demand for tourism services. Various figures and percentages that are claimed to reflect historical and projected aviation emissions (but which lack the proper scientific foundation) are

regularly quoted in the media leading to a false public image of the sector. ICAO is continuing with its work to facilitate the development of the most sophisticated tools to estimate aviation emissions. Four models are currently being run to estimate current and future aviation emissions on a gate-to-gate basis, under various scenarios, in order to facilitate policy decisions in this area. In





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addition, ICAO has developed and made available to the public a tool to estimate aviation emissions on a passenger-per-trip basis that can be used in offsetting schemes. The *ICAO Carbon Calculator* is the UN carbon-neutral programme reference tool for air travel estimates, and is currently being used by airlines, corporations and offset schemes. ICAO is also enhancing its data collection from States on air traffic operations and fuel used to further strengthen its statistics programme in this field.

With all these initiatives, ICAO expects to better inform the public by continuously providing high quality, authoritative data on international aviation emissions. It is prepared to undertake any role on the assessment, monitoring, reporting and

verification of these emissions. One crucial area that remains to be explored is the assessment of land use effects when comparing transport modes and their infrastructures. ICAO is closely following discussions in this important area and will take part in the methodological work as it relates to air transport. Of note is that aviation has a minimum interference in land-use and land-use-change when compared with road and rail infrastructures.

Clear progress is being made by the Organization on the estimates of aviation's non-CO<sub>2</sub> contributions, and it remains essential that uncertainties be reduced further as research continues on the effects of aviation in order to fully account for its contribution to climate

change. It is only reasonable, however, and in the interest of the environmental debate, that a proportional and pragmatic approach be adopted that addresses the climate problem in a rational and environmentally-effective way. Aviation emissions are part of the problem and they remain a serious challenge. ICAO, together with its contracting States and the aviation industry, must continue to work hard to address them.

#### **Proposals on the table**

The ongoing negotiations under the UNFCCC on a new global agreement on climate change have touched upon several issues associated with the treatment of GHG emissions from international aviation. With respect to



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institutional arrangements and funding the following key issues have been identified during the UNFCCC negotiations to this point.

**Institutional arrangements:** Parties have proposed a number of options regarding which body is best suited to address the emissions (ICAO or UNFCCC) and what countries should be considered (all countries or just the developed ones). The deadline for completing the negotiations also varies in these proposals from COP15 in 2009 to COP17 in 2011. Details of the proposed options may be found in the revised negotiating text.\*

**Funding:** One key aspect of the proposals deals with raising funds for actions to address climate change. The collected resources would be made available to developing countries through the financing mechanism expected to be agreed in Copenhagen. There are proposals for a number of new funds, or new ‘funding windows’ consisting of new consolidated funds, and these are not necessarily linked to any environmental benefits or a proportional share approach. The focus of these funds is generally, but not exclusively, on adaptation, in particular for least developed countries (LDCs). In terms of the source of monies for funds that specifically target international bunker fuels, the options in the current negotiating text include: levies on emissions from international aviation and maritime transport and/or funding from the auction of emissions allowances under an “international regulation scheme”; an international air passenger levy on airfares (with possible exceptions on journeys originating in and destined for LDCs and or SIDS); and an alternative to the options above contemplating a “share of proceeds from measures to limit or reduce emissions from international aviation and maritime transport”.

None of these proposals reveals the scale of monies that may be raised by these financing schemes. Some studies and publications estimate that levies (or other comparable, market-based measures) on international aviation or aviation-plus-maritime emissions would range from \$4 billion to \$45 billion per year. Most of these estimates are on the order of \$10 billion annually. How rigorous any of these analyses of potential money flows are is quite unclear and groups are likely oblivious to the political and procedural implications of asserting new financial imposts on these sectors—not to mention the resistance they will meet in doing so.

With all options open and fundamental issues still remaining to be defined, it is not clear what form the international bunker fuels debate will take in the run-up to and at Copenhagen. These discussions might be fuelled by unrealistic expectations about revenues that might be extracted from the global aviation and marine sectors for climate change needs in developing countries, coupled with seemingly compelling concerns about growing emissions in these sectors. Moreover, there will be many other north-south agendas that might affect the meeting’s

\* The details of proposed options on international bunker fuels in the revised negotiating text are included in document FCCC/AWGLCA/2009/INF.1, paragraphs 135 to 138.1 (page 132 to 134), available at [www.unfccc.int](http://www.unfccc.int).



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deliberation on this issue. That being said, the event also provides a tremendous opportunity to define a global sustainable framework for addressing international aviation emissions.

In addition to the proposals from Parties to address aviation emissions, industry, showing a very proactive approach, developed its own ideas that are worthy of separate mention. These include the proposal from IATA (please see detailed article on page 17) on a plan for air transport carbon neutrality by 2050, as well as one from the Aviation Global Deal (AGD) Group—a coalition of aviation industry stakeholders which is being presented in various fora, including UNFCCC session side events\*

With all options still on the table, the window of opportunity to establish a meaningful framework to address emissions from international aviation is wider than ever. The role of ICAO in facilitating discussions among States and the aviation community has therefore never been so important.

The options being proposed are in part a reflection of the lack of definition to date with respect to the main features of the new climate agreement, including the level of the global emissions reduction targets, the level of ambition of developed countries reduction commitments, the role of emerging economies vis-à-vis the CBDR principle, and sectoral and sector-specific approaches, to mention but a few.

This lack of definition makes it difficult for States to undertake decisions as this stage, as this could somehow affect negotiations regarding other main elements. This was the case during the meetings of the GIACC, where States were concerned with taking decisions relating to a specific sector before reaching an agreement under the UNFCCC on the big picture.

It should also be of note that the recent G8 summit in July in Italy declared itself in support of responsible leadership for a sustainable future, one in which:

*“...attention should also be devoted to sectors, such as international aviation and maritime transport, that represent a significant and growing source of emissions and are characterised by a predominantly international dimension. We will use our participation in ICAO, IMO and UNFCCC processes to reach an agreed outcome for the post-2012 period to rapidly advance towards accelerated emissions reductions for the international aviation and maritime sectors.”*

Paragraph 72, G8 Summit Declaration

### The way ahead

It is against this background that ICAO will be holding its High Level Meeting (HLM) on International Aviation and Climate Change from October 7–9, 2009, in Montreal. The HLM agenda builds upon requests from the last Assembly, the results of the GIACC and the decisions of the ICAO Council, and will cover issues related to:

- International aviation emissions goals and implementation options.
- Proposals for strategies and measures to achieve emissions reductions.
- Means to measure progress.
- Financial and human resources.
- A review of the ICAO Programme of Action on International Aviation and Climate Change and recommendations to COP15.

In addition to the HLM, ICAO will be holding an international Conference on Alternative Fuels for Aviation, hosted by the Brazilian authorities, from November 16–18, 2009, in Rio de Janeiro. The joint results from the alternative fuels event in Brazil and the HLM will ultimately form the message from ICAO to the UNFCCC.

The HLM provides the opportunity for all ICAO Contracting States (the vast majority of which are also Parties to the UNFCCC) to have a substantive and structured debate on aviation, with expert advice. Such dedicated debate has not occurred in the UNFCCC process and, in light of all the more vital and pressing issues at stake, it becomes even more unlikely that it would happen prior to COP15.

It is of note that, although representing the views of its States, ICAO has observer status at the UNFCCC meetings. Good cooperative relations exist between the two bodies but this status, allied with the agenda and working methods adopted at these meetings, do not allow for full participation or facilitate a deep consideration of international aviation



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emissions. The ICAO Council decision to hold the HLM prior to COP15 was therefore also intended to facilitate such a deeper discussion to assist Parties in their deliberations in Copenhagen.

The Organization is fully aware of the extent of the opportunities and difficulties that await in bridging the different views. In progressing its Programme of Action on International Aviation and Climate Change, ICAO is cognizant that any strategy agreed at the HLM will need to integrate all the elements desirable in an ambitious package that will demonstrate the determination and commitment of the international community to address both climate change and economic (and sovereignty) issues.

Such a package could include a clear framework-level agreement that provides for technological and operational goals and measures and defines the features of possible global market-based measures—the details of which will be worked out in the coming year(s) taking into account the basic

features of the new climate agreement. Building upon the experience gained in the implementation of the provisions in the Kyoto Protocol on the treatment of international aviation emissions, Parties may wish to take this tremendous opportunity to ensure that any future agreement should fully reflect the global nature of the international aviation sector—for which a globally-effective framework to address its emissions is indispensable.

In undertaking all these efforts, ICAO is ensuring that it will be cooperating in the most effective manner possible with the process leading to a successful new climate agreement; one that builds upon the strengths of those involved and that targets an environmentally-sustainable response as its legacy to future generations.

In the spirit of the cooperation enshrined in the Chicago Convention, ICAO will strive to facilitate a globally acceptable, well structured, long-term solution which will allow a sustainable future for aviation. ■

# Establishing aspirational goals

**John Begin, ICAO Chief, Coordination, Revenue and Communications Office**

As with any combustion of fossil fuels, aircraft jet engines emit a variety of substances, including carbon dioxide ( $\text{CO}_2$ ). With the realization that the quantities of  $\text{CO}_2$  emitted into the atmosphere from human activities have reached a proportion which is affecting climate, the world community has endeavoured to stabilize or reduce the levels of human-caused  $\text{CO}_2$  in the atmosphere. International aviation is no exception to these efforts and it continues to take strong actions to address this concern.

International aviation operates in a globally-harmonized system that was developed and is maintained through ICAO. The Organization, a specialized agency of the United Nations comprised of 190 Member States, works principally through national civil aviation authorities. In September, 2007, the ICAO plenary body, known as the Assembly, adopted Resolution 36–22, Appendix K—the ICAO *Programme of Action on International Aviation and Climate Change*. This Resolution, *inter alia*, requested the ICAO Council to form a new Group on International Aviation and Climate Change (GIACC).

The GIACC was formed by the Council and was comprised of 15 senior government officials representative of all ICAO Regions. This reflected equitable levels of participation from

developing and developed countries. Technical support was provided by the ICAO Committee on Aviation Environmental Protection (CAEP) and administrative support was provided by the Secretariat. The Group met four times over a period of 18 months and established a number of working groups to progress its work between meetings.

The GIACC held its fourth and final meeting May 27–29, 2009, which is documented in a report. The report contains the GIACC Programme of Action which lists the consensus achieved by the group. Noteworthy is that consensus was reached on short-, medium- and long-term aspirational goals in the form of fuel efficiency. Also noteworthy is the basket of options agreed by GIACC which provides ICAO'S Member States with a series of measures from which they can choose to adopt measures suitable for their particular circumstances.

The GIACC's aspirational goals call for an improvement of two percent per year in the average fuel efficiency of the global in-service fleet of civil aircraft operated internationally for the time frame of 2010–2012, 2013–2020 and 2021–2050. These goals will further improve fuel efficiency beyond the 70 percent historical improvement achieved by aviation to date. In order

to accurately measure performance to these goals, the GIACC recommended and the Council directed the ICAO Secretariat to strengthen its data collection and reporting mechanisms.

The GIACC's basket of options identifies measures that can improve fuel efficiency. These include, *inter alia*, improvements in airframe and engine technologies, more efficient routing and air traffic management, and methods to improve operational efficiencies—both in the air and on the ground. The Council called upon the ICAO Secretariat to further develop and refine this basket of measures and to also continue to develop and update, as necessary, guidance to States on the adoption of the measures; including measures to assist developing countries, as well as access to financial resources, technology transfer and capacity building.

The GIACC was recognized by the Council as having fulfilled its mandate and no further work is expected of the group. The Council undertook to establish a process to develop a framework for market-based measures in international aviation which will take into account the conclusions of an ICAO High-Level Meeting in October and also the outcomes of the COP15 meeting in December 2009. ■



*John Begin was formerly the Secretary to the Group on International Aviation and Climate Change (GIACC). He has held a variety of management positions over the past 30 years in the aerospace and airline industries and has extensive educational and professional experience with all facets of the environmental field, including active involvement in the issues of climate change, local air quality and aircraft noise. Begin was a lead author of the IPCC Special Report on Aviation and the Environment and has co-authored many papers on forecasting and economic analysis. He was appointed to the post of Deputy Director, Air Transport Bureau, in January 2006, and was subsequently appointed to his current posting in the Office of the Secretary General.*



# Reducing greenhouse gas emissions from international aviation

This year has been referred to as “*the year of climate change*”—one of the greatest challenges of our time. Science has already spoken clearly and the world is now waiting for a clear and significant response from political leaders.

As Yvo de Boer, Executive Secretary of the United Nations Framework Convention on Climate Change points out, that answer needs to come from the UN Climate Change Conference in Copenhagen (COP15) at the end of this year, and any response to climate change will be incomplete if a solution to international bunker fuels is not found. The leaders of the G8 underlined this fact in their most recent statement, stressing the need for agreement for the post-2012 period to rapidly advance towards accelerated emissions reductions for the international aviation and maritime sectors.

International aviation is an important sector for the global economy and for trade. With approximately two percent of global emissions of greenhouse gases (GHGs) attributed to it, it is also a significant contributor to climate change. If left unchecked, aviation's current and projected growth could have further impacts on climate.

According to data from the International Energy Agency, CO<sub>2</sub> emissions from international aviation have increased by 42 percent between 1990 and 2005. Recent studies estimate that aviation contributes to an estimated Radiative Forcing (RF) of between 3.5 and 4.9 percent of total anthropogenic RF. Though CO<sub>2</sub> emissions from international aviation is a concern, it is a concern that can be channelled into opportunities for both developed and developing countries to reduce emissions—as well as to generate revenues for mitigation and adaptation actions in developing countries.

One challenge that needs to be addressed is that the United Nations Framework Convention on Climate Change (UNFCCC) is based on the principle of common but differentiated responsibilities, while ICAO is based on the principle of non-discrimination. Innovative thinking and solutions are needed to reconcile these principles. Developed countries must lead in reducing emissions, while developing countries need support to engage in mitigation actions.

Under the UNFCCC, Parties are now in full negotiation mode developing a text which will continue to be the focus of discussions in the run-up to Copenhagen. Party proposals addressing international aviation emissions include the setting of sectoral targets and working through ICAO to achieve these targets.

It was 12 years ago that ICAO was entrusted by the Parties to work on greenhouse gas emissions from international aviation. In response, ICAO's Committee on Aviation Environmental Protection (CAEP) and Group on International Aviation and Climate Change (GIACC) have delivered a number of studies

and proposals which must now be converted quickly and decisively into practical policies and measures.

The GIACC recently agreed a global aspirational goal to improve the fuel efficiency of international civil aviation by two percent annually. To reverse the trend of emissions from international aviation to this degree, however, stronger measures are needed—such as a medium-term goal on carbon-neutral growth or long-term goals on carbon emissions reductions and market-based measures operating across national borders. The international community is demanding clear signals and plans of action from all sectors, with unambiguous targets, adequate means of implementation and hard deadlines.

At its upcoming ICAO High-Level Meeting on International Aviation and Climate Change, the results of the GIACC will provide a starting point for ICAO Member States to seek consensus on outstanding issues. ICAO's input to COP15 will be agreed upon at this event and should ideally result in a series of 'measures'—including on the use of market-based measures and a concrete plan for their implementation that will regulate the GHG emissions from international aviation.

Market-based measures can reconcile the principles of ICAO and the UNFCCC by raising funds for adaptation and mitigation in developing countries through a global cap on aviation bunker fuels, as well as by deploying revenues from emissions rights auctions primarily in developing countries. A global cap on bunker fuels would be in line with the 'equal treatment' principle of ICAO, and using the revenues to assist developing countries in addressing climate change would be in line with the provisions of the Climate Change Convention.

Informing COP15 on practical actions for regulating international bunker fuels would make a significant contribution to an effective, agreed outcome in Copenhagen. Parties to the UNFCCC are looking forward to receiving input from ICAO and its upcoming High-Level Meeting should be a major step in that direction. ■



# Halting climate change: Calculating greenhouse gas emissions from UN air travel



Ivar A. Baste, Director,  
Environment Management  
Group (EMG) Secretariat,  
United Nations Environment  
Programme.

The earth's surface is warming. This is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.

The warming will continue if the current emissions of greenhouse gases (GHGs) and degradation of forests proceeds unchecked. An additional warming this century greater than 2°C presents a severe danger to human society. Global annual GHG emissions need to be dramatically reduced by 2050 to keep this additional warming from happening.

In December, nations will meet in Copenhagen to complete negotiations on a global agreement to address the climate challenge. The UN Secretary-General, Ban Ki-moon, has referred to it as the "defining challenge of our age", and has called for the UN system to lead by example.

In response, the heads of the UN agencies, funds and programmes, in a 2007 statement by the Chief Executives Board on Coordination (CEB), committed to moving their respective organizations towards climate neutrality. It involves calculating GHG emissions, reducing such emissions and offsetting any remaining emissions by purchasing certified emissions reduction credits (<http://cdm.unfccc.int>).

A number of countries, local authorities, companies, and organizations have declared their aim to become climate neutral and have joined the UNEP Climate Neutral Network (<http://www.unep.org/climateneutral>). Civil aviation may wish to play its role in such an initiative.

The UN has joined hands to implement its commitment under the auspices of the Environment Management Group (EMG), chaired by Achim Steiner, Executive Director of the UN Environment Programme (UNEP) with the support of UNEP's Sustainable UN facility (SUN). A first priority has been to develop a common methodology for the UN to calculate its GHG emissions so as to allow for aggregation and comparison of data, as well as the development of benchmarks for emissions reductions and offsets.

Special attention has been given to emissions from air travel, as these represent a large share of the total

#### THE ENVIRONMENTAL MANAGEMENT GROUP

The Environmental Management Group (EMG) is a system-wide UN coordination body. Its membership consists of the specialized agencies, programmes and organs of the United Nations including the Secretariats of the Multilateral Environmental Agreements.

The EMG is chaired by the Executive Director of United Nations Environment Programme (UNEP) and supported by a Secretariat provided by UNEP. It furthers inter-agency cooperation in support of the implementation of the international environmental agenda, identifies issues on the agenda that warrant joint efforts and finds ways of engaging its collective capacity in coherent management responses to those issues.

GHG footprint of the UN. Emissions are calculated from the exact routing of travel and it has been agreed to limit the calculation of such emissions to CO<sub>2</sub> while seeking further guidance on how to account for all GHG effects from aviation.

Identifying the emissions from air travel has turned out to be a significant challenge for the UN, as it requires the collection of thousands of data elements. It is a small but illustrative example of obstacles encountered in getting on with the job of halting climate change.

To help solve the challenge, ICAO—the UN body which governs international civil aviation—set out to prepare a UN Interface to its Carbon Calculator. The calculator is attractive because it is based upon the best publicly available industry data and its methodology is publicly reported. Furthermore it is peer-reviewed, regularly maintained and has been adopted by ICAO's Committee on Aviation Environmental Protection

(for more on the calculator please see page 24).

The interface version of the calculator facilitates quick calculations for any number of travels and is now adopted as a common UN tool. It complements a recently-developed UN GHG calculator for other emissions sources prepared with support of the UN Department of Field Support (<http://www.unemg.org>).

Supported by these calculators, the GHG inventory process is now well underway in most organizations of the UN system and examples of emissions reduction initiatives are growing. A few organizations, including UNEP, have already become carbon neutral. A meeting of the EMG in the margins of the 64<sup>th</sup> Session of the UN General Assembly in September of this year is scheduled to guide further work and report on progress to the climate change conference in Copenhagen.

Calculating the UN's emissions from air travel is but one important element in the move towards a climate neutral UN—one among the many needed to halt the trend of global warming. A critical milestone in such a move is Copenhagen, where the UN global campaign *Seal the deal!* is calling on nations to reach a fair, balanced and effective global climate agreement.

The UN, by words but also very much here by deeds, is determined to be part of the transition to a low carbon, resource-efficient green economy. What is at stake is an earth not inherited from our parents, but borrowed from our children. ■

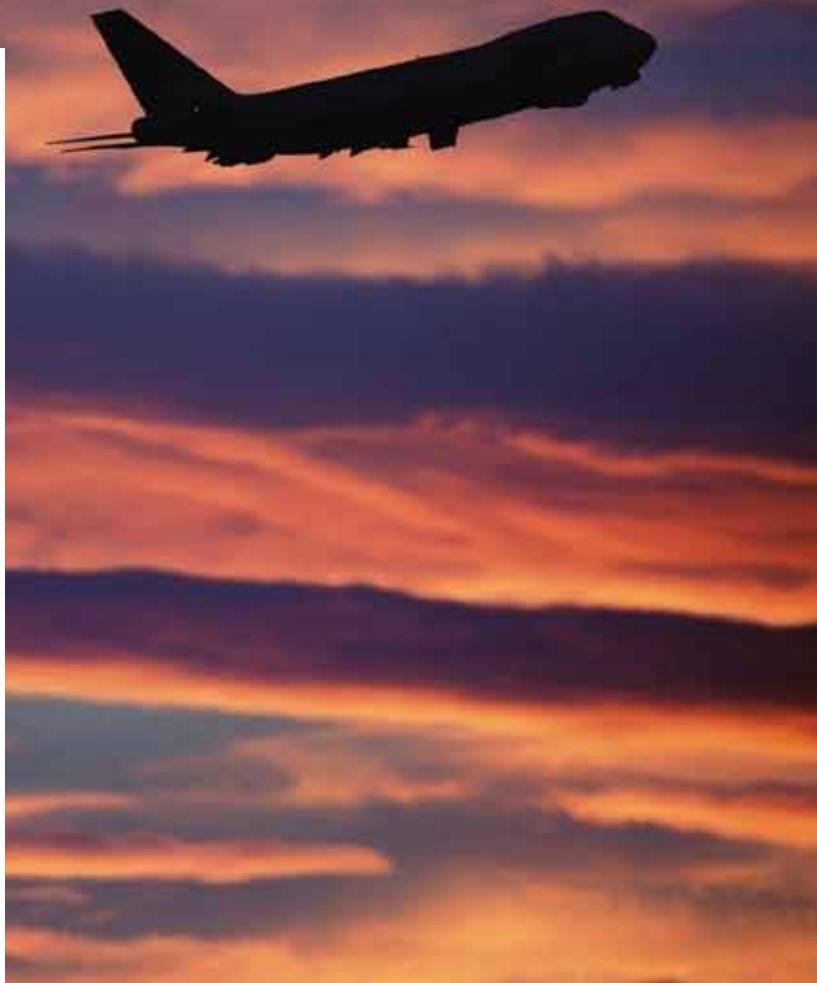


# Aviation and climate change: Pathway to Copenhagen and beyond

The COP15 process presents a unique opportunity for close cooperation between industry and government to address aviation's climate change impact. As Paul Steele, Director of Aviation and the Environment for the International Air Transport Association reports, while the positions towards climate change negotiations in Copenhagen (COP15) are unfolding, the airline industry is assuming its responsibility by making significant commitments to reduce its emissions, based on concrete targets and a strong track record. At the same time it is calling on governments to adopt a global and sectoral approach to aviation emissions.



*Paul Steele is Director of Aviation and the Environment of the International Air Transport Association (IATA). Prior to joining IATA in December 2007 he was Chief Operating Officer of WWF International.*



Aviation is responsible for approximately two percent of global man-made CO<sub>2</sub> emissions. Recognizing the growing and urgent need to address the adverse effects of climate change, especially those undermining sustainable economic and social development and efforts to eradicate poverty, the airline industry has in recent years established a comprehensive and ambitious framework to lower its levels of greenhouse gas (GHG) emissions.

As early as 2007, the global airline community adopted a vision for the industry to reach carbon-neutral growth and to build carbon-free aircraft within 50 years. To support this vision, airlines, working through IATA, adopted a four-pillar strategy which promotes and drives efforts in four key areas: improved technology, effective operations, efficient infrastructure and positive economic measures.

Since its inception, efforts coordinated under the industry strategy have delivered substantial reductions in emissions. In 2008, IATA's efforts saved 15 million tonnes of CO<sub>2</sub>. In 2009, we are forecasting a 6.5 percent fall in CO<sub>2</sub> emissions from 666 million tonnes in 2008 to 623 million tonnes in 2009. Some 4.7 percent of this is from cuts in capacity as a result of the global economic downturn but the remaining 1.8 percent is attributable to efficiencies achieved under the four-pillar strategy.

In June 2009, the IATA Board of Governors made a landmark decision to adopt a set of ambitious targets to mitigate GHG emissions from aviation:

- A cap on aviation CO<sub>2</sub> emissions from 2020 (carbon-neutral growth).
- An average improvement in fuel efficiency of 1.5 percent per year up to 2020.
- A reduction in CO<sub>2</sub> emissions of 50 percent by 2050, relative to 2005 levels.

### Achieving carbon-neutral growth

Carbon-neutral growth (CNG) is a fundamental milestone on the route towards a zero-carbon future for aviation. It ensures that aviation's net CO<sub>2</sub> emissions stop growing, even when demand for air transport continues to grow. The achievement of CNG thus responsibly balances the contribution made by a sustainable, competitive and healthy aviation sector to the global economy with the urgent challenge of combating climate change.

The airline industry is the first to make such a bold commitment at the global level. To achieve it, a multi-faceted approach is required with a strong commitment from all aviation stakeholders: airlines; manufacturers; fuel suppliers; airports; air navigation service providers and governments. The need for the airline industry to continue to have the capacity to invest in emissions mitigation measures must be central to any approach.

Key drivers towards achieving carbon-neutral growth, as well as the associated CO<sub>2</sub> benefits and required capital expenditures, are summarized as follows:

**Fleet renewal:** Airlines will likely need to spend \$1.5 trillion on new aircraft by 2020, which will result in a 21 percent reduction in CO<sub>2</sub> emissions compared to a scenario without fleet renewal. This means 5,500 aircraft will be replaced by 2020, or 27 percent of the total fleet.

**Operations:** Improved operational practices, including reduced auxiliary power unit (APU) usage, more efficient flight procedures, and weight reduction measures, will achieve three percent emissions reductions by 2020. The related costs are estimated at \$1 billion.

**Infrastructure:** Full implementation of more efficient air traffic management (ATM) and airport infrastructure could provide an additional four percent emissions reduction globally by 2020, while benefits could be as high as 10 percent in some regions. The Single European Sky (SES/SESAR) (70 percent cut in route extension), Next Generation ATM in the United States (57 percent delay reduction), Pearl River Delta, reduced vertical separation minima (RVSM) over Russia, flex tracks, etc., would require investments of \$58 billion.

**Engine retrofits & airframe technology:** Modifications to the existing fleet using current technologies (winglets, drag reduction, etc.) could achieve an extra one percent emissions reduction by 2020 for an estimated investment of \$2 billion.

**Biofuels:** Recent tests on biofuels have demonstrated that a reduction of 80 percent of CO<sub>2</sub> emissions, on a full carbon life-cycle basis, can be achieved. Assuming availability of a six percent mix of 2<sup>nd</sup> generation (sustainable) biofuels by 2020, this would reduce aviation CO<sub>2</sub> emissions by a further five percent, requiring industry and government investment of \$100 billion.

**Offset mechanisms:** In order to 'close the gap,' 90 million tonnes of CO<sub>2</sub> will need to be offset by 2025 to mitigate emissions to 2020 levels and achieve carbon-neutral growth. By 2025, this will cost an additional \$7 billion per year to achieve.

Overall, this puts the capital expenditure by airlines for achieving carbon-neutral growth by 2020 at \$1.6 trillion.

### Key principles for a global and sectoral approach for aviation

The industry is working hard to reduce emissions and governments at Copenhagen will be discussing their role to help meet that goal. The following key principles should guide the inclusion of aviation CO<sub>2</sub> emissions in the broader Copenhagen framework:

**Global sectoral approach:** In a post-Kyoto framework, aviation CO<sub>2</sub> emissions should be addressed through a global sectoral approach, accounting for emissions at the global level, not by state. Policy measures must be developed at a global level to avoid the unilateral imposition of targets and measures, and to avert creating a patchwork of conflicting and potentially overlapping national and regional policies.

**Full integration of aviation emissions in the United Nations Framework Convention on Climate Change (UNFCCC):** For a sectoral approach for aviation to be effective it must have an open design. This means that aviation should have unrestricted access to carbon market instruments to meet its obligations, on a par with other sectors. The full integration of aviation emissions in the UNFCCC framework, accompanied by

specific reduction targets, should make this possible.

**ICAO leadership in the UNFCCC process:** The airline industry reiterates its support of ICAO and endorses ICAO as the appropriate United Nations body for making aviation-specific recommendations in the Copenhagen climate negotiations to develop a sectoral approach to address aviation emissions.

ICAO must assume responsibility for the oversight of a global sectoral approach for aviation. It is the organization that is able to do so in the most efficient and cost-effective manner. IATA can provide support to ICAO in this area.

**Accounting for emissions:** It is essential that emissions be accounted for at global, not Regional or national levels. The aviation industry should be held accountable (and pay) for its emissions once, whether from international or domestic activities. Any emissions-related measures should result in credits for their contribution to achieving the sectoral targets for reducing the industry's global CO<sub>2</sub> emissions.

**Equal treatment vs. differentiated responsibilities:** 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 the implementation of measures. A global sectoral approach is the best way of achieving this, bearing in mind the need to minimize competitive distortions.

**Basket of measures:** In considering various mitigation measures, it is important to consider the interactivity of measures: some mitigation measures



are mutually supportive while others are not. For example, unduly stringent economic measures can reduce the sector's ability to invest in further emissions-reducing technology, operational and infrastructure measures. Thus, a balance across the full range of mitigation measures must be achieved.

**Government action:** We are looking to governments to make the necessary investments to modernize air traffic management and improve airport infrastructure. They must also establish legal and fiscal frameworks to facilitate and increase investment in new aircraft fleets, low carbon sustainable alternative jet fuels, as well as the potential use of cost-effective economic measures and full and unrestricted access to all available abatement measures outside the sector (offsets).

**Cost-effective economic measures:** Economic measures to address GHG emissions from aviation must be cost-effective and non-discriminatory. These measures could include emissions trading, carbon funds, offsets or other similar mechanisms as long as they are implemented globally, on the basis of consensus, provide full and open access to the global carbon market and developed and agreed through ICAO. Economic measures must not create 'carbon leakage' where emissions transfer between countries or carriers leading to market distortions.

**Use of revenues:** 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 directly improve the emissions profile of aviation, for instance, by supporting the development and deployment of more fuel-efficient aircraft and low-carbon jet fuels. The balance of such revenues may be used to acquire certificated emissions reductions derived from recognized climate mitigation and adaptation projects, provided that airlines are able to benefit from these reductions.

### **An important moment for aviation**

The next year will be critical for the aviation industry. Governments stand at an environmental crossroads as far as aviation is concerned. At a time when the sector is facing the greatest economic challenge in its history, it is important that governments take the right road. This is the road that leads to effective measures to reduce emissions, rather than the bumpy track to punitive measures that do little for the environment but just penalize the industry. ICAO is the policeman standing at the crossroads directing the traffic. Its influence and its advice to governments and the UNFCCC will be critical. ■

# CANSO's green agenda



**Adam J. Phelan, Environment Manager, CANSO**

*Adam J. Phelan has been seconded from Airservices Australia for two years to lead CANSO's environment policy work. He has spent almost nine years at Airservices, where he has held several regional management positions, holds a degree in Business and has particular expertise in project management and international business relations.*



A global phenomenon is occurring. It is happening now and its starting to have a major impact on the way in which we all live, work and interact—it's called 'enhanced environmental awareness.'

Everything we do, everything we use and everything we create is now under the microscope. Governments, communities and individuals globally are all examining the impact their own actions are having on the environment, and more importantly they want to do something about it.

The aviation industry is not immune to this phenomenon and is actively

embracing change as a means of improving its role as a responsible global citizen.

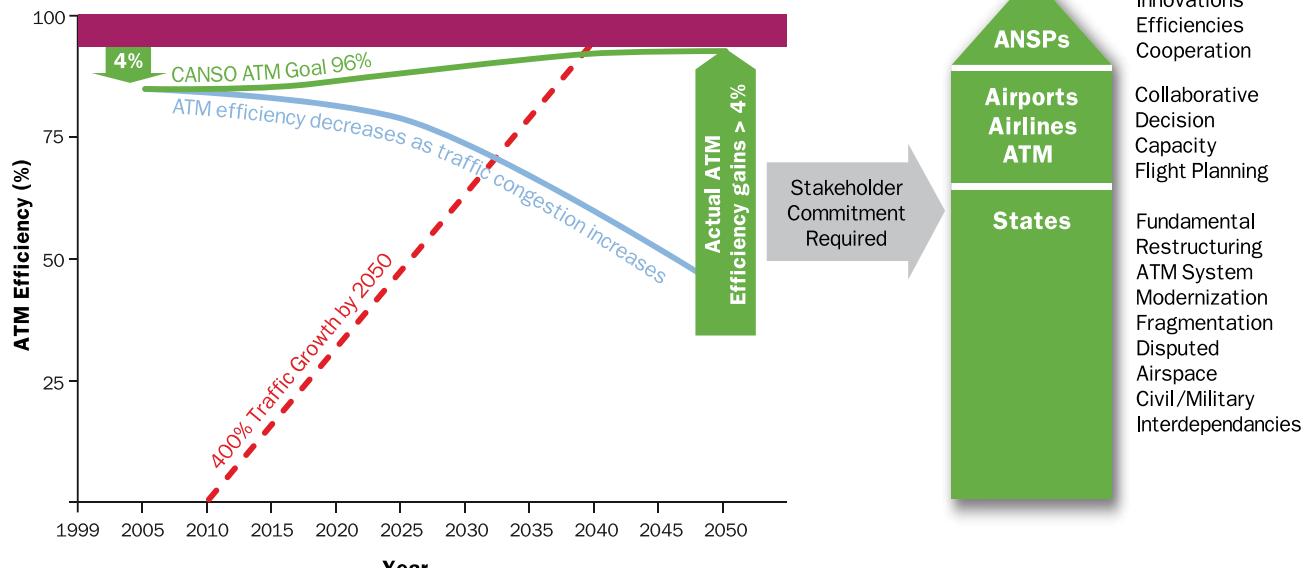
Recognizing the need to stay at the forefront of change to ensure long-term sustainability and growth, the aviation industry is striving to enhance the effect of the measures that reduce its impact on the environment.

CANSO is actively contributing. Air Navigation Service Providers (ANSPs) today, all around the world are investing in ways to cut fuel burn and to improve airspace efficiency.

ANSPs fully understand that the greatest contribution they can make to reduce aviation's impact on the environment is to increase fuel efficiency for aircraft using the ATM system.

More fuel-efficient routes between city pairs, investments in new technology such as Automatic Dependent Surveillance—Broadcast (ADS-B), the introduction of operational procedures such as Continuous Descent Approach (CDA) and the implementation of Performance Based Navigation (PBN) standards, all allow for more efficient use of airspace.

**Figure 1: ATM Efficiency & Air Traffic Growth**



CANSO recognizes that it must fully support its members in achieving these challenges. CANSO heavily promotes the adoption of more efficient practices, of new technologies and operational procedures. It is committing to initiatives designed to cut fuel burn and emissions from aircraft and is utilising the expertise of its Global Environment Workgroup to promote environmental and operational efficiency, set goals and targets and develop tools to assist ANSPs improve efficiency across the global network of airspace.

But what about longer term aviation sustainability?

In late 2008 CANSO released a report titled *ATM Global Environment Efficiency Goals for 2050*. This was a significant milestone for CANSO as it was a piece of work that had not been undertaken at a global scale by an ANSP group before.

The report establishes CANSO's aspirational goals for fuel efficiency improvement and is driving the debate among ANSPs about where improvements may be found, as well as contributing to international debates about aviation's climate change impacts.

The report recognizes that there are important trade-offs or interdependencies that preclude complete efficiency in the ATM system, however, through cross-industry collaboration, CANSO believe the impact of these interdependencies can be minimized.

Global benchmarks are an emerging field and CANSO is focused on taking this work further. In 2009/10 CANSO will develop guidelines for ANSPs on measuring their environmental performance, implementing environment management systems and developing ATM targets for reducing noise and emissions. These outputs will form part of CANSO's contribution to the ICAO Council's Committee on Aviation Environmental Protection (CAEP), a Committee at which CANSO has Observer status through its member representative Mr. Ian Jopson of NATS.

CANSO believes that the key to leveraging the shift towards an 'enhanced environmental awareness' is through greater industry cooperation. Bridging the gap between ANSPs, airports, airlines, military and regulators is imperative to achieving global standardization and environmental best practice.



Over recent months CANSO has committed to initiatives such as the European CDA Action Plan, and the ICAO/IATA Global Performance-Based Navigation (PBN) Task Force that is focused on a more rapid implementation of PBN.

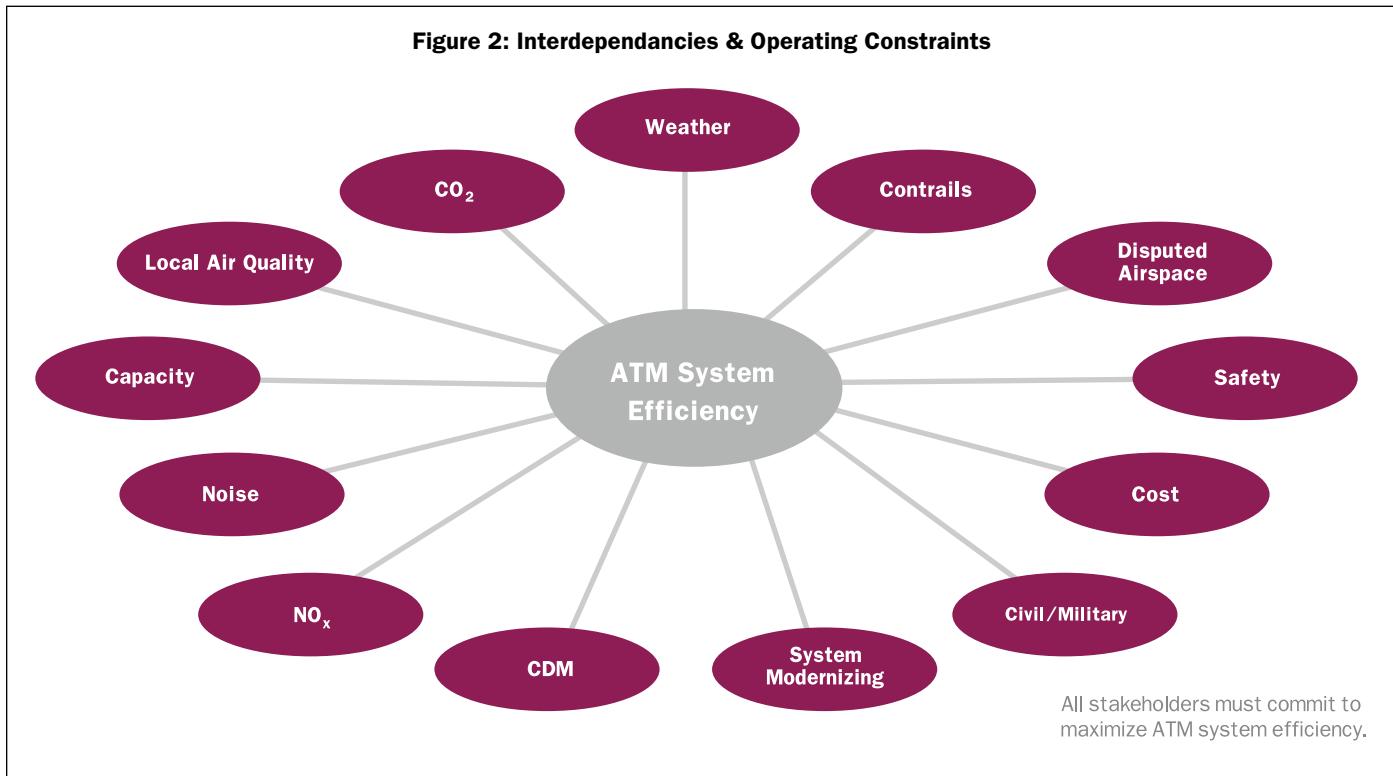
Seeking to achieve global implementation of PBN is important to CANSO as it provides a clear path in addressing global aviation system capacity, efficiency, environmental and safety issues.

These issues remain at the heart of the CANSO IMAGINE 2010 Programme and CANSO's mandate to improve air navigation services on the ground and in the air.

Under the Industry Declaration in support of PBN implementation, CANSO is committed to:

- Supporting the timeframe set out by ICAO for global implementation.
- Working collectively with industry to facilitate global implementation.
- Assisting governments and ANSPs understand the environmental and operational benefits.
- Promoting the environmental and operational efficiency benefits of performance based navigation technologies and implementation initiatives.

**Figure 2: Interdependancies & Operating Constraints**



The European Continuous Descent Approach (CDA) Action Plan exemplifies the role CANSO plays at a regional level.

The CDA Action Plan offers an opportunity to save over 150,000 tonnes/year of fuel worth around 100 million Euro per annum in ECAC, while at the same time reducing CO<sub>2</sub> emissions by almost 500,000 tonnes per annum and reducing noise impact on the ground by around 1–5 dB per flight.

Aiming to achieve substantial reduction of CO<sub>2</sub> through improved operational initiatives supports CANSO's key priority to promote the delivery of air traffic services in ways that minimize the impact of aircraft operations on the environment.

As a signatory to the plan, CANSO is committed to:

- Supporting closer cooperation between airports, airlines, EUROCONTROL, and CANSO European members.

- Stimulating demand for CDA take up and implementation.
- Supporting the further development and promulgation of CDA globally.

'Enhanced environmental awareness' is here and it's gaining momentum. As we move closer to the United Nations Climate Conference in Copenhagen in December 2009, the momentum will build, and so too will expectations of key industry sectors such as aviation to find ways to reduce carbon emissions and climate change.

CANSO views this as an opportunity for change. An opportunity to improve the way in which the industry operates, an opportunity to invest in new technologies and concepts, and an opportunity to come together in unity to set and achieve new goals.

The opportunity for change is here and now, and ANSPs are rising to the challenge to do their part in mitigating the impact of international aviation on climate change. ■



# Sustainable approaches for alternative fuels and energy in aviation



*Philippe Novelli is in charge of R&T programme management at the Office National d'Etudes et Recherches Aérospatiales (ONERA) in France, as well as development activities in ONERA's Fundamental and Applied Energetics Department. He started his career at ONERA in 1990 in the field of CFD for combustion and advanced propulsion systems, and was project manager of the ONERA-DLR cooperative programme on high-speed propulsion. Novelli has also held positions related to the coordination and development of space transportation activities at the Business Development Directorate of ONERA.*

Considering the dependence of transport, in particular aviation, on petroleum to satisfy an increasing energy demand, the impact of fossil fuel use on global warming and local air quality, as well as the impact of volatile oil prices on the economic situation of fuel users, the question of which alternative options the aviation sector should pursue in the future needs to be addressed.

In this context, the European Commission's Directorate General for Energy and Transport has initiated the Sustainable Way for Alternative Fuel and Energy in Aviation (SWAFEA) 26-month study to investigate the feasibility and the impact of the use of alternative fuels in aviation. The broader objective is to evaluate the potential of and perspectives on new energy sources in aviation.

SWAFEA's goal is to develop a comparative analysis of different energy/fuel options on the basis of a synthesis of the available data. It also seeks to create a vision and possible roadmap for future alternative deployments and, in this regard, SWAFEA will provide policymakers with information and decision elements.

A comprehensive answer to the issues raised by the introduction of alternative fuels in aviation requires thorough consideration of a number of various and interdependent multidisciplinary

topics, not only technical but also environmental and economic.

As a first step, the study is building a synthesis of the present knowledge; embracing the results of the various ongoing projects and industrial initiatives. Promising options will then be analyzed in-depth from the point of view of their use in aviation, and technical studies and tests will be performed to complement existing data regarding specific requirements for aviation.

The environmental impact of these fuels, considering their entire life cycle and also the ecological and societal impact of their use, will be assessed in parallel. The contribution to greenhouse gas effects will be a major concern, with a requirement for the new options to have a better carbon footprint than present fuels and meet additional EU requirements for sustainable biofuels. The sustainability of the production is a second critical aspect which requires, in particular for biofuels, taking into account questions such as land use, potential competition with food chains or induced pollution. Local air quality factors will also be considered.

Economical aspects will be studied with a view to the business case of new solutions and the timeframes for their possible implementation. These various elements will contribute to the definition of a deployment roadmap, addressing additionally political measures and research and develop-

## SWAFEA CONTRIBUTING PARTNERS:

ONERA	CONCAWE
DLR	EADS-IW
IFP	EMBRAER
UNIVERSITY OF SHEFFIELD	ERDYN
ALTRAN	IATA
BAUHAUS LUFTFAHRT	INERIS
AIRBUS	ROLLS ROYCE (UK and Germany)
AIR FRANCE	SHELL
CERFACS	SNECMA

ment needs. Input from industry will be assessed, validated and put into a coherent reporting framework by a team of researchers.

To address these various topics, a team coordinated by ONERA, the French Aerospace Laboratory, has been formed comprising 19 European and international partners representing aircraft manufacturers, air transport, the oil industry, research and consulting.

In addition, a stakeholder forum with all relevant European stakeholders will be established that will allow for an exchange of information and best practices, along with the communication and validation of the results. Cooperation with other international initiatives will also be a priority; e.g. with the US CAAFI initiative. Final results from the SWAFEA effort are expected to be available in the first half of 2011. ■

# The ICAO Carbon Calculator: Improving on a great tool for the public and industry

[www2.icao.int/en/carbonoffset](http://www2.icao.int/en/carbonoffset)

In June 2008, ICAO's Carbon Calculator was launched on its Web site, providing the public with the means to estimate the CO<sub>2</sub> emissions associated with air travel. Developed with the aim of being both transparent and accurate, the tool uses a methodology and data sources that are publicly available, while the operational data is kept up-to-date by drawing on the latest statistical information collated and published by ICAO.

To give users added understanding and confidence, the methodology is published alongside the calculator together with an invitation and opportunity to provide feedback on potential improvements. To date, feedback from the public has endorsed the need for the calculator and, as continuous review and improvement are a high priority for the calculator team, the public can expect a number of enhancements in the near future.

Guidance on what to look for in a carbon offsetting scheme is also currently being developed, as is a methodology for estimating the emissions associated with air freight. Calculating the emissions from air cargo is a complex task and experts from around the world are presently evaluating two methodologies and a number of potential data sources for this update to the calculator.

CAEP is committed to reviewing new data sources as they become available, making improvements to the methodologies used, and assisting the ICAO Secretariat in the ongoing task of refining both the presentation of this leading and practical tool as well as its associated explanatory text. ■



**Figure 1: Sample results available from the ICAO Carbon Calculator**

Here is your footprint:

1 passenger, flying round trip from MONTREAL (YUL) to LOS ANGELES, CA (LAX) ( 3,969 Km ), in Economy Class, generates about  
**582.50 Kg of CO<sub>2</sub>**

[Less Details](#)  
[New Calculation](#)

More information for you:

Source: From MONTREAL (YUL) to LOS ANGELES, CA (LAX) ( 3,969 Km )

- This itinerary is served by the following aircraft: 320,734
- Each flight consumes an average of 11,984 Kg of fuel
- The average number of seats per flight is 179
- The average CO<sub>2</sub> emitted per passenger is 582.50 Kg

[Help us improve the calculator](#)

# Airbus: Pursuing new milestones in aircraft efficiency



*Philippe Fonta joined Airbus in 1992, working successively for its Flight Operations Support and Services, Marketing Division and the Environmental Affairs team. Since 2007, he has served as Head of Sustainable Development for Airbus and as Vice-Chairman of the Aircraft Noise and Engine Emissions Committee (ANEEC)—the environmental committee of the International Coordinating Council of Aerospace Industries Associations (ICCAIA: one of the observer organizations to the ICAO CAEP). Since 1999, Fonta has also acted as the Airbus representative in the ICAO Forecasting and Economic Analysis Support Group (FESG).*

Environmentally speaking, 2009 is the climate change year. Indeed, everyone expects the future Conference of the Parties (COP15) in December to agree on a deal that would pave the way for a post-Kyoto world.

Airbus considers that properly dealing with the environmental footprint of its activities and products, including their potential impact on climate change, are key. Our responsibility as an aircraft manufacturer is to tackle, in a systemic approach, all environmental issues that may affect the future of our sector. Considering the global picture is essential for worldwide activities like ours, and we are playing a proactive part of international initiatives in this respect, particularly at the ICAO level.

Airbus was created in the early 1970s and founded on international, European-rooted cooperation at a time when the world was facing its first oil crisis. The company has

consequently embedded its development and success on technological breakthroughs for eco-efficient aircraft, setting the standards of the subsequent fleet composition. The A300B was, for instance, the first twin-engine wide body aircraft with high by-pass ratio engines, establishing a major milestone in fuel burn and noise reduction.

With the progressive introduction of advanced materials and optimized design and manufacturing processes, Airbus has continuously been offering a range of eco-efficient aircraft to meet its customers' expectations. The A380, burning less than three litres of fuel per 100 pax/km is the perfect example of current technological capabilities with its remarkable performance of 75 g of CO<sub>2</sub> per pax/km. And this is only the beginning of a new era!

Our current challenge is to discover and assist with the emergence of those technologies that will enable Airbus to offer a new, eco-efficient breakthrough aircraft to replace the current and efficient A320 family. Among existing and future technologies, environmental choices will have to be made but, beyond these purely technological considerations, public opinion and public expectation will also exert pressures possibly affecting our choices today and directions for the future.

Airbus will keep providing its experience and expertise to the overall process, and will support any set of options (market-based measures, or new standards, or the improved availability of greener alternative fuels, etc.) that will prove to be fair, efficient and acceptable in the long-term in order to ensure that the sector's capability to reduce its environmental impact, while still delivering its economic and social benefits, can be maintained. ■



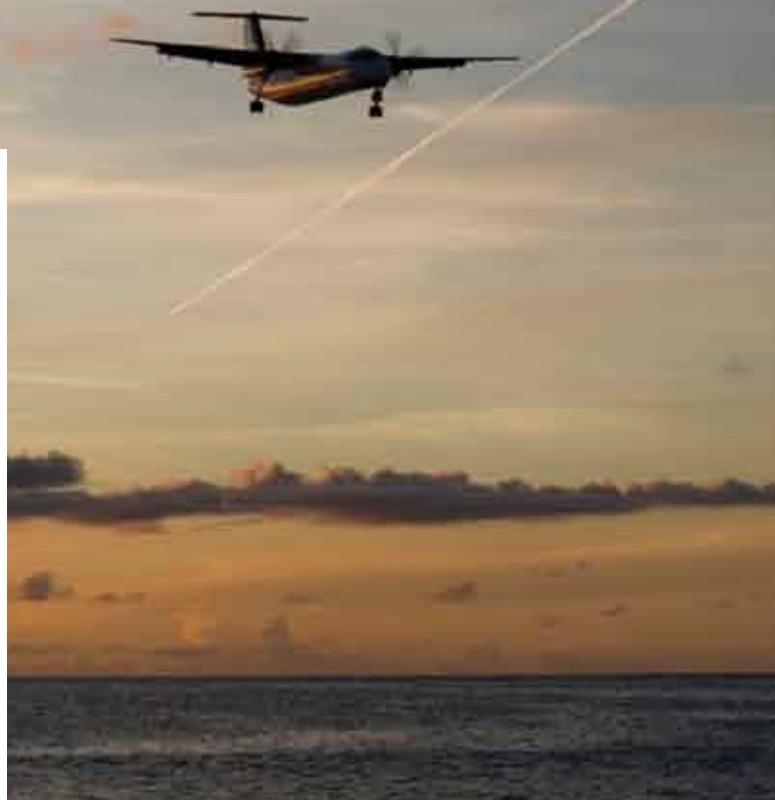
## How we get there: The potential of market-based measures

ICAO has been addressing the need for greater research into aviation emissions solutions since 1998, with successive ICAO Assemblies agreeing Resolutions to provide the global air transport community with more comprehensive data and analysis on the potential role of market-based options, including emissions charges, fuel taxes, carbon offsets and emissions trading regimes.

In this special report for the *ICAO Journal*, Christopher Surgenor, Editor of GreenAir Online, outlines the history of ICAO's important contribution to this ongoing effort and the role it will need to play in the implementation of any proposed solution.



Christopher Surgenor is the Editor of GreenAir Online, an international and independent online publication reporting on aviation's impact on the environment and climate change ([www.GreenAirOnline.com](http://www.GreenAirOnline.com)).



The use of Market-Based Measures (MBMs) as a means of limiting civil aviation's impact on climate change has proven to be a particularly intractable and contentious issue facing ICAO and the air transport industry. With growing calls for international aviation greenhouse gas emissions to be discussed at the United Nations Framework Convention on Climate Change (UNFCCC) Copenhagen talks in December and for the sector to be included in a post-2012 climate agreement, much attention has been focused on a global sectoral approach in which carbon markets would play an important role.

In response to a request by the Group on International Aviation and Climate Change (GIACC), ICAO's Committee on Aviation Environmental Protection (CAEP), Forecasting and Economic Analysis Support Group (FESG) and the Modelling and Database Task Force (MODTF) came up with projections

for global aviation CO<sub>2</sub> emissions through 2050. Not accounting for the impact of alternative fuels, CO<sub>2</sub> emissions are predicted to grow from 632 mega tonnes (Mt) in 2006 to between 890 and 2,800 Mt by 2050, with a probability towards the higher range.

In the CAEP paper to the GIACC/4 meeting in May, the two groups concluded that although efficiencies from technology and operational measures are expected to continue to improve through 2050:

*“...even under the most aggressive technology forecast scenarios, this anticipated gain in efficiency does not offset the expected growth in demand driven emissions.”*

An emissions gap relative to 2006 or earlier levels will therefore exist in the future, requiring some form of intervention in order to achieve sustainability—possibly through a combination of alternative fuels, unforeseen technological advances and MBMs.

The International Air Transport Association (IATA) recently set an industry target for 10 percent of its aircraft fuel needs to be met with biofuels by 2017; however, the development of alternative aviation fuels is still in its relative infancy. Concepts like blended wings and hydrogen-powered aircraft have also been suggested but they remain similarly nascent. This leaves us with MBMs.

MBMs have been under consideration by ICAO for over 10 years and the CAEP has undertaken detailed analyses of possible market-based measures, pursuant to Resolutions by various Assemblies, since 1998. CAEP established the Market-Based Options Working Group (WG5) to identify and evaluate the potential role of market-based options, including emissions charges, fuel taxes, carbon offsets and emissions trading regimes. FESG was tasked to conduct an analysis of the economic effects of the options under consideration.

In 2001, CAEP demonstrated that the most cost-effective and efficient measure to reduce international aviation emissions and meet Kyoto Protocol targets was an ‘open’ emissions trading system in which aircraft operators have access to a carbon market where they can buy carbon credits for emissions reductions from other industry sectors. Contracting States had, however, different views on the implications of such a system.

CAEP WG5 also analyzed emissions-related levies, focusing on three options:

- A fuel (or en-route emissions) tax with revenue going to national treasuries.
- A revenue-neutral, aircraft efficiency charge which would reward operators employing more modern, fuel-efficient aircraft and penalize the less efficient.

- An en-route emissions charge with revenues returned to the aviation sector.

CAEP found that implementing a fuel tax would raise legal issues concerning air services agreements and ICAO policies, and, if not applied worldwide, could cause tankering practices.

An en-route emission charge would be consistent with ICAO policies, provided revenues were used to mitigate the environmental impact from emissions. If not applied worldwide, however, such a charge would raise equity and competitiveness issues.

A revenue-neutral charge would also be consistent with ICAO policies, but this would require an acceptable method to be developed for defining aircraft efficiency and could not be implemented in those areas which do not have en-route charges.

Differing views within CAEP marked the beginning of the debate on the role of ICAO in respect of an international levy and the implication of an international approach versus an individual nation state approach.

The impact on demand of MBMs differed from one measure to another. The measure with the smallest impact on demand was found to be the open emissions trading system. In 2001, the implementation of such a system was considered a long-term objective since an international cap on emissions was required and the Kyoto Protocol had not been ratified at the time. In the interim, voluntary measures were considered the best approach for early action, with priority consideration given to developing guidelines for their rapid implementation, including the establishment of a transparent mechanism to evaluate the improvements achieved.

The main options considered by CAEP on voluntary measures were:

- An industry initiative, including a target and a set of actions to achieve it.
- A negotiated agreement between industry and government to take a set of actions, and/or to achieve a specific emissions target.
- A hybrid option under which one of the two previous options are used in conjunction with another market-based measure.

CAEP found that voluntary measures alone could not achieve an ambitious emissions reduction target and would have to be used in conjunction with other measures. Voluntary measures were regarded as transitional, allowing industry to undertake activities related to ‘capability building.’ A key issue was the need to ensure that such actions would be to the advantage of the participants if market-based, or other regulatory measures, were imposed at a later date.

In 2003, CAEP tasked a consortium of consultants led by ICF Consulting with providing recommendations for a comprehensive set of design specifications for an open trading system for international aviation emissions. Three options were proposed although no approach was recommended by the consortium:

- An emissions trading system (ETS) integrated with the existing Kyoto Protocol cap-and-trade system, where international aviation emissions would be merged with domestic emissions systems.
- An aviation-specific system based on a new ICAO legal instrument voluntarily joined through international agreement.
- A voluntary ETS managed by ICAO, where design issues and targets would be developed by participants.

In 2004, the ICAO Assembly did not manage to reach a consensus on emissions charges or emissions trading but there was general agreement on voluntary approaches.

The following year, a Special Group of the ICAO Council undertook a legal review of market-based measures. Consensus was not reached on many of the issues, but it was agreed that emissions charges linked to the damage caused by climate change would not be in contravention of the Chicago Convention as long as no State exemptions were made. An earlier paper from the ICAO Secretariat concluded that although emission-related charges would, in principle, be compatible with the Convention and ICAO policies, taxes would not.

The 2007 Assembly created GIACC with a mandate to address both UNFCCC negotiations for post-Kyoto targets and the use of MBMs, including emissions trading, in international aviation emission reductions. An Assembly Resolution (A36-22) addressed MBMs and acknowledged the principles of non-discrimination and equal and fair



opportunities to develop international civil aviation, as set out in the Chicago Convention, as well as the principles of common but differentiated responsibilities (CBDR) and respective capabilities under the UNFCCC and the Kyoto Protocol.

Appendix L of the Resolution recognized that a majority of States endorsed the application of emissions trading for international aviation only on the basis of mutual agreement, but that other States consider that any open ETS should be established in accordance of the principle of non-discrimination. It urged States not to implement an ETS on other States except on the basis of mutual agreement. ECAC States entered a formal reservation against this, which led to the eventual incorporation of carriers operating to, from and within Europe into the EU Emissions Trading Scheme (EU ETS). The appendix also requested studies to examine the potential for carbon offset mechanisms as a further means of mitigating the effect of aviation emissions.

In 2008, CAEP published ICAO Doc 9885 —*Guidance on the Use of Emissions Trading on Aviation*, to provide advice and practical information that States would be able to use when incorporating emissions from international aviation into emissions trading schemes.

During the GIACC process, an Economic (later renamed Market-Based) Measures Working Group (MBM WG) was formed to

look at recently-announced industry proposals and the different scenarios available, as well as to examine the work ICAO had already conducted on MBMs and the importance of avoiding duplication. It was also asked to explore the scope of what could be achieved through MBMs and related metrics.

The MBM WG reviewed schemes developed at the national or Regional level, such as the EU ETS and similar schemes proposed by Australia and New Zealand, as well as a Canadian proposal. It also considered industry proposals for a global sectoral approach to address international aviation emissions from the Association of European Airlines (AEA) and the Aviation Global Deal (AGD).

The group generally agreed that MBMs implemented by States or by Regions with different policies and parameters, in the absence of a global sectoral framework developed by ICAO, are far from optimal. This approach may make coordination more difficult, create risks of distortion of competition, create unnecessary burdens for industry and complicate industry compliance.

A unique global sectoral system was acknowledged by the group to be a more desirable option. Enforcement powers would, however, have to be established by ICAO or another UN agency. The group concluded that implementation of such an approach would face major challenges, particularly in the short- and medium-term. ■



The UN World Environment Day, celebrated every year on June 5<sup>th</sup> and first established by the United Nations General Assembly in 1972, is a people's event which seeks to inspire action by governments, industries, community groups and individuals aimed at improving the environment.

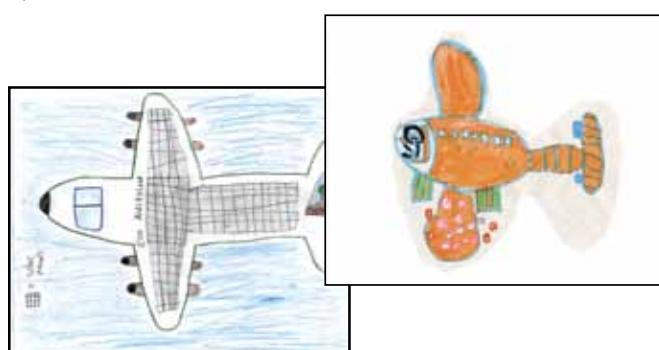
*Your Planet Needs You! UNite to Combat Climate Change* was chosen as the Environment Day theme for 2009. This is a fundamental and decisive year for climate change legislation, with governments meeting in Copenhagen in December for COP15 to debate and agree on new measures that will help the global community to address climate change. UN World Environment Day celebrations have taken place in many countries all over the world during 2009, with a major exhibition having been held in Mexico—this year's UN host country.

To show its support for World Environment Day, ICAO invited children and dependants of ICAO employees to submit drawings on the theme of *Aviation in a Green Environment*. The purpose of the contest was two-fold: while it raised awareness and promoting dialogue on climate change issues among ICAO staff and their families, six drawings from the contest were also selected to illustrate the upcoming edition of the triennial *ICAO Environmental Report*.

All drawings submitted by the young artists were on display in the atrium of the ICAO headquarters in Montreal. Prizes were awarded to the best drawings addressing the theme of *Aviation and Environment*. ■



The ICAO drawing contest award ceremony. Shown here are Folasade Odutola, ICAO ATB Chief (right); Garleen Tomney (mother of the winning artist, centre); and Lorenzo Gavilli, Junior Professional Officer, ICAO ENV Section (left).



Eco-aviation: a solar-powered airplane

## Chilean deposit

Chile deposited its instrument of ratification to the Montreal Convention of 1999 during a brief ceremony at ICAO headquarters on March 19, 2009. ■



*Show on the occasion (from left to right) are: Mr. Juan Carlos Rojas, Alternate Representative of Chile to ICAO; Mr. Patricio Manuel Victoriano Muñoz, Consul General of Chile in Montreal, Representative of Chile to ICAO; Mr. Denys Wibaux, Director, Legal Affairs and External Relations Bureau; and Mr. Francisco Costa, Alternate Representative of Chile to ICAO.*



## Deposit by India

India deposited its instrument of accession to the Montreal Convention of 1999 during a brief ceremony at ICAO headquarters on May 1, 2009. This brings the total number of parties to the Convention to 91. ■

*Show on the occasion are: Dr. Nasim Zaidi, Representative of India on the Council of ICAO; and Mr. Denys Wibaux, Director, Legal Affairs and External Relations Bureau.*

## GIACC Programme of Action sets climate goals, proposes useful measures to improve efficiency

GIACC recommended a global aspirational goal of 2 percent annual improvement in the fuel efficiency of international civil aviation's in-service fleet. Cumulatively this translates to a 13 percent sectoral reduction by 2012, a 26 percent drop by 2020, and over a 60 percent improvement by 2050 (2005 baseline).

The GIACC plan takes into account the principles and provisions on Common But Differentiated Responsibilities (CBDRs) under the United Nations Framework Convention on Climate Change (UNFCCC), as well as the principles of non-discrimination and equal and fair opportunities to develop international aviation contained in the Convention on International Civil Aviation, the charter of ICAO.

To help those States requiring assistance in achieving the recommended goals, GIACC proposes a basket of measures available to reduce greenhouse gas (GHG) emissions. They cover: aircraft-related technology development, including advances in aircraft design as well as the development of "drop-in" biofuels to replace fossil-based fuels; improved air traffic management and infrastructure use; more efficient operations; economic/market-based measures; and regulatory measures.

Given diverging views on the application of market-based measures across national borders, the GIACC recommends that the ICAO Council establish a process to develop, expeditiously, a framework for market-based measures in international aviation, taking into account the conclusions of an ICAO High-Level Meeting on the subject to be held from 7 to 9 October and the outcome of the Conference of the Parties (COP15) of the UNFCCC in Copenhagen, in December. GIACC members agreed at the outset that their decisions should not prejudge the outcome of the negotiations under the UNFCCC and Kyoto Protocol. ICAO has worked closely with the UNFCCC and its subsidiary bodies over the years with respect to CO<sub>2</sub> emissions from international civil aviation (*editor's note: for more on the GIACC process and conclusions please see "Establishing aspirational goals" on page 13 of this issue.*) ■



Attendees to the final Meeting of the ICAO Group on International Aviation and Climate Change (GIACC). Chairperson *Gilberto López Meyer* (centre left) and Vice-Chairperson *John Doherty* (left) are joined on the occasion by Council President *Roberto Kobeh González* (center-right), and *John Begin*, GIACC Secretary and ICAO Chief, Coordination, Revenue and Communications Office (right).



## STAP/14

A Panel on the ICAO Statistics Programme was held in Montreal in March 2009. It was attended by a total of 32 participants from 13 States and six international organizations.

The issues discussed focused mainly on the changes and improvements that could be implemented in the current Statistics Programme. ■



## Ensuring aviation safety to sustain and enhance economic growth

The Dominican Republic is situated approximately 1,280 kilometres southeast of Miami, Florida, and is bordered in the Greater Antilles by Cuba to the west and Puerto Rico to the east.

The island of Hispaniola, which the Dominican Republic shares with Haiti, totals some 76,480 square kilometres—making it the second largest island in the Caribbean. The Dominican Republic itself occupies 48,442 square kilometres of the Hispaniola land mass, with its population currently estimated at 9 million inhabitants. The country operates seven international airports which, in 2008, managed a combined total of 175,000 air operations moving a total of 9.4 million passengers.

Over the years, aviation has become the cornerstone of the Dominican Republic's main economic activity—tourism—

Samaná El Catey International Airport (Aeropuerto Internacional Presidente Juan Bosch). One of seven international airports serving the Dominican Republic, this new facility was opened in 2006 and helped contribute to the 175,000 aircraft movements and 9.4 million passengers facilitated by Dominican aviation in 2008.

and the development of the State's air transport sector is consequently very closely linked to the ongoing growth and prosperity of the island's tourist-related infrastructure and activities.

### A founding ICAO State confronts modern aviation's challenges

The Dominican Republic's aviation history goes back to the first part of the twentieth century. It was among the original 54 nations invited by the United States to the 1944 International Civil Aviation Conference in Chicago, thus making it an original signatory to the Chicago Convention and a founding member of the International Civil Aviation Organization (ICAO).

Today, the Dominican Republic is represented in ICAO by Ambassador Carlos Veras supported by the Dominican

Delegation. Mr. Veras also proudly performs the duties of his State in its responsibilities as a member of the prestigious ICAO Council.

Virtually all aviation activity in the Dominican Republic relates back to its new State Law 491-06, which was established in 2006 to provide a more effective and comprehensive framework than earlier legislation in this regard, covering all aspects of the State's air navigation services, air transport and flight operations. Law 491-06 also provided for the creation and ongoing role of the Dominican Republic Civil Aviation Institute (IDAC)—a self-financed public entity that oversees the day-to-day technical supervisory control and supervision of the nation's aviation-related infrastructure and activities.

The country has also established the Dominican Republic Civil Aviation Board (JAC), a broader political and economic oversight body made up of all stakeholders with an interest in the continued safe and efficient operations of the nation's air transport sector. The JAC regulates the air carriers that serve the Dominican Republic and all other economically important aspects of the aviation sector. Since IDAC maintains responsibilities associated with the day-to-day operations of the State's air transport system, the JAC also serves as a more

independent body responsible for accident and incident investigations.

Though the Dominican Republic's aviation laws and governance frameworks have been recently modernized and improved, it realizes that there is still much to do to ensure that its aviation sector continues to provide the levels of flight safety and passenger-focused service quality that the State's many visitors have come to expect. Whereas the last five years have arguably represented the most important period in the Dominican Republic's aviation history, officials remain keenly aware of the determination, discipline and seriousness that will be required from all parties if it is to continue on its present and successful course.

#### **Recent achievements and future goals**

In January of 2009, The Dominican Republic was recognized as being among the safest States in civil aviation by ICAO's Universal Safety Oversight Audit Programme. With the inauguration of its new Aeronautical Complex, a large-scale initiative made possible in large part due to the strong support of the State's President, Dr. Leonel Fernández, the Dominican Republic is now also aiming to become a regional supplier for the much-needed training of qualified aviation professionals.

The quality of aviation services in the Dominican Republic has also been internationally recognized—the best proof of which is the ISO 9001:2000 certification received by its Integrated Quality Management System. This qualifies the State as one of the most reliable aviation providers in its Region.

The Dominican Republic occupied the Presidency of the Latin American Civil Aviation Commission (LACAC) from 2000–2002, and recently obtained, during a past meeting of the executive committee of this organization that took place in Chile, LACAC's first Vice-Presidency. It will host the next LACAC ordinary assembly in 2010.

These are just a few of the many aviation-related achievements that have been accomplished by the State in recent memory. One additional point that would be worthy of mention is that, after 14 years, the Dominican Republic has now regained Category 1 status under the FAA's International Aviation Safety Assessments (IASA) programme, meaning that aircraft with Dominican registration marks are permitted to fly to and from the United States of America.

Passengers board a flight at Punta Cana International Airport. The facility is the third largest in the Caribbean and the only Regional airport with direct flights to Asia.



## **Filling a Regional role: The new IDAC Aeronautical Science Academy and Complex**

The IDAC, supported by State law 491-06 of civil aviation, recently created the Aeronautical Science Academy (ASCA) to better serve and advance the technical and professional development of aviation specialists in the country and Region.

The Academy is located in the Dominican Aeronautical Complex, which was built at a cost of U.S. \$20 million and inaugurated by President, Dr. Leonel Fernández, earlier this year. Besides the ASCA, this Complex will also house the State's Air Navigation, Flight Standards and Safety Oversight Departments. It is located at Las Americas International Airport (Dr. José Francisco Peña Gómez) and was built by the IDAC with the collaboration of ICAO and the United Nations Development Programme (UNDP).

The ASCA has a surface area of 2,500 square metres, and contains facilities for an aerodrome simulator, a RADAR

simulator, an audiovisual room for self-learning classes, a library, audiovisual equipment, etc. It has a conference room with a capacity for 200 persons, six very comfortable classrooms equipped with air conditioning, as well as other rooms to be used as support areas.

### *Academy background*

The ASCA was created as a necessary adjunct to the Dominican Republic's Aeronautics Training Center. Its purpose is to optimize training activities for operational personnel and to update their exposure to the newest measures and technologies related to their areas of specialization.

### *Integration with the ICAO TRAINAIR Programme*

Presently, the Dominican Republic is in the process, with the helpful guidance of experts from the Technical Co-operation Bureau of ICAO, of developing Standard Training Packages (STPs) for its Academy curricula in order

to obtain certification as a full member of the ICAO TRAINAIR programme. This membership allows it to access the TRAINAIR STP sharing system and better provide high level training to international standards.

### *Academy staff*

The academy's staff of instructors have all been trained by renowned international institutions such as ICAO, the FAA, COCESNA and the IACC. It is expected that the academy will have commenced formal operations in September 2009. ■



The Dominican Republic is proud to present this State Profile to the global aviation community, and to know that it clearly reflects how our State has made tremendous, step-by-step advances in recent years. This progress has been comprehensive in that it has affected and improved upon our State's air transport infrastructure, equipment and technology, as well as the ongoing and focused training of our skilled personnel—our single most valuable civil and commercial aviation asset.

This presentation is the simplest and perhaps the most effective form of invitation we can extend to all who may be interested in visiting our incredible country. We hope that it has provided you with the assurance of reliable and safe flights to and from your home countries, and we wish all members of the global community a pleasant stay among the beautiful nature and spectacular beaches we have to offer you, in a climate of national peace like no other in the world.

**José Tomás Pérez**  
*Secretary of State  
Director General  
Dominican Republic Institute of Civil Aviation (IDAC)*

# 2009–2010 ICAO CALENDAR OF EVENTS

<b>2009 Meetings</b>	<b>Site</b>	<b>Duration</b>
ICAO-World Bank—Routes Development Forum Maximizing Civil Aviation's Contribution to Global Development Aviation Development: Focus on Asia/Pacific	Beijing, China	14 – 15 September 2009
Fifth Symposium on ICAO MRTDs, Biometrics and Security Standards	ICAO Headquarters, Montreal	21 – 23 September 2009
Global ATM (Air Traffic Management) Forum on Civil/Military Cooperation	ICAO Headquarters, Montreal	19 – 21 October 2009
ICAO Alternative Fuels Conference	Rio de Janeiro	16 – 18 November 2009
Airports Economics Panel-Air Navigation Services Economics Panel	ICAO Headquarters, Montreal	30 Nov – 4 Dec 2009
Technical Advisory Group-Machine Readable Travel Documents (TAG-MRTD/19)	ICAO Headquarters, Montreal	7 – 9 December 2009

<b>2010 Meetings</b>	<b>Site</b>	<b>Duration</b>
Next Generation of Aviation Professionals Symposium	ICAO Headquarters, Montreal	1 – 4 March 2010
ICAO Global Air Transport Outlook Symposium (GATOS)	ICAO Headquarters, Montreal	13 – 15 April 2010
ICAO Environment Symposium	ICAO Headquarters, Montreal	10 – 14 May 2010
Diplomatic Conference	ICAO Headquarters, Montreal	21 Jun – 9 Jul 2010

# Instituto Dominicano de Aviación Civil

Año del Centenario del Natalicio de Juan Bosch

Sede de Navegación Aérea Jorge Botello



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