

ECAC news

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TACKLING CLIMATE CHANGE

*Aviation's contribution
to the global efforts*

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Tackling climate change: How aviation's future starts today

Ingrid Cherfils
President of ECAC



As ECAC President, I am pleased to introduce this issue of ECAC News on climate change with the Bratislava Declaration, endorsed by ECAC's 44 Member States on 3 September. This common statement is the outcome of 44 voices coming together as one, to reaffirm Europe's commitment to engage, from its very start, in a global market-based measure scheme, that will enable the effective offsetting of aviation carbon dioxide emissions through international carbon markets. Moving forward through change, for any sector, requires vision, unity and efforts. **ECAC Member States are ready to turn the aspirational vision expressed in the 2013 ICAO resolution into a reality.**

Our sector is, by nature, global and interdependent. It relies on worldwide standards and rules. Many initiatives are already in place through the "basket of measures" (as described by Jane Hupe in this issue), which is implemented by Member States and the industry to improve fuel efficiency by 2% each year. However, this will not be sufficient to keep CO₂ emissions at the level of 2020, and this gap requires urgent action. Indeed, our sector is growing, so is our carbon footprint, and that is not sustainable. **This is our opportunity to demonstrate that our sector is not only willing to contribute but also to address its share of the global issue.**

As we gather in Montreal at the end of this month for the 39th ICAO Assembly, addressing climate change through an agreement on a global market-based measure scheme will be our main priority. The challenge is for ICAO and for us, its 191 Contracting States, to deliver on a global market-based measure scheme. One that is simple, mandatory in time, robust, non-discriminatory and effective. This would be the first ever global agreement covering a whole sector. With its two-fold phasing approach, the proposed scheme takes into account the various capabilities of States, aware that environmental efficiency can be best ensured if the largest number joins in at the early stages. **The more united we are, the more sustainable our sector will become.**

Aviation is a vital, dynamic sector, capable of innovation, commitment and change. Looking at what has been achieved in 60 years, since the creation of ECAC, I am confident that by working together with a common vision, sustainable environmentally responsible air transport is achievable. This is a challenging goal but we have a unique opportunity to achieve it, one which we could look back upon as an accomplishment for the international civil aviation community. Global cooperation is the path towards aviation thriving in the future, the ICAO Assembly is the place to build it, the time is now. **Let us make this next ICAO Assembly our united response to our common challenge.**





1 From left to right: ECAC Executive Secretary S. Sciacchitano - ICAO EUR/NAT Regional Director L. Fonseca de Almeida - Director General for Civil Aviation, Slovakia, M. Nemeth - European Commission (EC) Director General for Mobility and Transport (DG MOVE) H. Hololei - ECAC President I. Cherfils - ICAO Air Navigation Bureau Director S. Creamer - EC DG MOVE Aviation and International Transport Affairs Acting Director Filip Cornelis.

2 From left to right: Slovakia Director General for Civil Aviation Mario Nemeth - Slovakia Transport Minister Arpad Ersek - ECAC President Ingrid Cherfils - ECAC Executive Secretary S. Sciacchitano - ICAO Secretary General Fang Liu - ICAO EUR/NAT Regional Director Luis Fonseca de Almeida - ECAC Deputy Executive Secretary Patricia Reverdy.

3. General view of DGCA/65 meeting.

DECLARATION OF DIRECTORS GENERAL OF CIVIL AVIATION OF EU MEMBER STATES AND THE OTHER MEMBER STATES OF THE EUROPEAN CIVIL AVIATION CONFERENCE: ADHERING TO THE GLOBAL MARKET-BASED MEASURE (GMBM) SCHEME FROM THE START

Whereas Assembly Resolution A38-18 decided to develop a Global Market-Based Measure (hereinafter referred to as "GMBM") scheme for international aviation, for decision by the 39th Session of the International Civil Aviation Organization Assembly;

Emphasising the commitment of the European Union (hereinafter referred to as "EU") and its Member States and the other Member States of the European Civil Aviation Conference (hereinafter referred to as "ECAC") to work towards the adoption by the 39th ICAO Assembly of a Global Market-Based Measure scheme, which aims to deliver the carbon-neutral growth of international aviation as of 2020;

Welcoming the adoption of the Paris Agreement at COP 21 and its objective of limiting global temperature increase to well below 2°C, pursuing efforts to limit the temperature increase to 1.5°C, and recognising the need for international civil aviation to contribute to the mitigation of climate change in that light;

Recalling that Europe considers that the scheme should be applicable to all States, unless exempted by the Resolution; aim to an emissions coverage that enables carbon-neutral growth from 2020 onwards; include a solid review clause that focuses on the need to increase environmental ambition over time and in light of the global objectives established under the Paris Agreement; take into account the special circumstances and respective capabilities of States, while ensuring non-discrimination such that all operators will be treated alike on the same route and avoiding market distortion;

Emphasising that Europe encourages as many ICAO States as possible and in particular all major aviation States to join from the beginning of the scheme, and to provide clarity on this before the end of the Assembly, and praising those who have already signaled their intention to do so, and notably the United States, Canada, Mexico and Indonesia;

Further recalling that Europe considers that the agreement should also include a clear roadmap for the remaining design elements to ensure that implementation is not delayed and its environmental effectiveness is ensured;

Recalling that the principles of environmental effectiveness, practicality, enforceability and non-discrimination should be taken into account in all components of the GMBM;

Emphasising the full commitment of the EU, its Member States and the other Member States of ECAC to the action against climate change through the full implementation of the basket of measures, as confirmed by the submission to ICAO of forty-one State action plans for emission reductions, which present their individual actions and the mitigating actions taken at European level;

Recognising the potential benefits from technological and operational improvements and use of alternative fuels to be taken into account in future reviews of the GMBM scheme and the goal for emissions reduction;

Recognising the European contribution to addressing the need for technical assistance and capacity building via the EU project on "Capacity Building for CO₂ Mitigation from International Aviation", in order to prepare for the implementation of the scheme; Directors General of Civil Aviation of EU Member States and the other Member States of the European Civil Aviation Conference declare that:

- They intend to implement the Global Market-Based Measure scheme for international aviation from the start, as long as the agreed scheme reflects the aforementioned considerations;
- They welcome the commitment of a number of key aviation States and Regions of the world to also join the first implementation phase of the GMBM scheme and call on other major aviation States and those having the capacity to do so to do likewise and make their decision public before the end of the ICAO Assembly;
- They will work actively with other partners in order to reach a successful outcome at the ICAO Assembly; and
- They will strive to address, together with others, any future needs that may arise from States requiring technical assistance and capacity building in order to stand ready for the implementation of the scheme, including the ICAO Standards and Recommended Practices to be developed under the future GMBM scheme.



Addressing environmental impacts of aviation: a comprehensive approach

Patrick Gandil

Director General for Civil Aviation, France, & ECAC Focal Point for Environment

Director General for Civil Aviation for France, Patrick Gandil, has been ECAC Focal Point for Environmental matters since 2008. In this article, he presents the main issues at stake and some of the initiatives taken to address them.

COP21, the 21st United Nations Climate Change Conference, took place at Paris-Le Bourget airport between 30 November and 12 December 2015. Everyone is aware of how important this conference was. The 196 delegations committed in the Paris Agreement to keeping the global temperature rise below 2°C and even to strive for 1.5°C. Civil aviation must contribute to achieving this goal, particularly through the action of ICAO at the global level, and ECAC at the European level.

ECAC plays an essential role in the harmonisation of European positions so that our region can speak with one voice in the ICAO forum thanks to co-ordination groups co-chaired with the European Commission. ECAC has been particularly active on CO₂ standards and global market-based measures for aviation (GMBM). A resolution on a GMBM will be presented to the 39th ICAO Assembly for approval.

► International actions

Air transport accounts for approximately 2% of global emissions of CO₂. The ICAO Committee on Aviation Environmental Protection (CAEP) estimates that emission volumes due to aviation will be four to six times higher by 2050 compared to the level in 2010, due to growth in traffic. To contribute to the objectives set in the Paris

Agreement, ICAO recommends a “global approach”, combining technological innovations, development of biofuels, as well as operational and economic measures. In this context, at the start of 2016, CAEP adopted the first aircraft certification standard for CO₂ emissions, confirming the commitment to combat climate change displayed by aviation following the COP21.

A global system of market-based measure (global MBM) scheme will also be developed to offset excess CO₂ emissions generated by air transport as of 2020. This global scheme will be discussed at the 39th ICAO Assembly, aiming for effective implementation in 2020. It would make air transport the first major sector to commit to a global scheme to limit emissions of CO₂. On these two fundamental matters ensuring the sustainability of aviation, ECAC has co-ordinated European positions in two dedicated working groups co-chaired with the European Commission (the European Committee for Aviation and Environmental Protection, “EuroCAEP” and the Market-Based Measures Co-ordination Groups, “MBM-CG”). In this context, the ECAC meeting of Directors General of civil aviation held in Bratislava at the beginning of September 2016 confirmed this momentum, highlighting the commitment of all ECAC Member States to act together towards adoption of a global market based measure scheme during the 39th ICAO Assembly.

Spearheaded by the European Commission, the Single European Sky is gradually taking shape. The aim is to create an airspace with improved performance, therefore with greater capacity and safety, offering more direct routes and optimised flying levels and paths, so that airlines can provide more efficient and cleaner flights.

The future of European air navigation is part of this Single European Sky, consisting of nine major airspace functional blocks that are independent of national borders. France is involved alongside Germany, Switzerland and the Benelux countries in the FABEC (Functional Airspace Block Europe Central), located at the heart of a region where air traffic is at one of the densest levels in the world.

As part of the implementation of the FABEC, the French civil aviation authority DGAC and its five European partners agreed to reduce the average difference between the most direct air route and the route actually followed by 5% by the end of 2014. The almost 12% reduction recorded at the end of 2014 shows that the objective was largely exceeded. This result represents a reduction in distance travelled by approximately 15 million kilometres with equivalent fuel savings, thanks to the technological component of the Single European Sky project, SESAR.

SESAR aims to modernise air traffic management in Europe by 2020. The DGAC is piloting some important projects in optimising

flows and the network of air routes, such as the Free Route airspace project. This demonstration flight project proposes introducing direct routes, and methods and procedures to achieve more flexible air space management and fuel savings, thus bringing substantial reductions in CO₂ emissions. Ultimately, SESAR will deliver more efficient air traffic management, with a 10% reduction in CO₂ emissions.

► French actions

Civil aviation must take into account three different nuisances, not only in terms of their impact, but also the population groups affected and the reactions they can trigger: CO₂ emissions, aircraft noise for airport-area residents and emissions of local pollutants. It is only possible to conceive a green aviation policy after ranking these three environmental priorities and defining how each one should be addressed.

In France, the development process of the Grenelle Environment debates led to this ranking and revealed noise as the main national priority. Because although global warming has greatly been in the public eye, particularly as it affects the entire population, noise is the nuisance that can primarily make or break an air project, or even lead to the closure of an airport. Issues of noise nuisance are essentially matters to be addressed by the government of affected populations. Therefore, the success of the civil aviation environmental policy depends on the ability to make significant improvements in this area, without being able to use simplistic measures of cancelling traffic. For civil aviation, there is indeed little room for manoeuvre if we want to safeguard jobs and economic activity, and preserve the service to citizens in need of transport.

REDUCING NOISE NUISANCE

Noise nuisance reduction over the past five years has focused on three pillars: financial aid for soundproofing, reducing noise at source and particularly altering flight paths to mitigate the most widely impacting nuisances.

This third pillar is the most significant without doubt. It has led to the modification of all flight paths in the Paris region, thanks to relentless efforts by all air navigation services. This is part of a very technically complex revolution in the Parisian context where there are three major airports: Roissy, Orly and Le Bourget. By changing the flight paths, several tens of thousands of people have seen a notable reduction in their noise exposure.

Furthermore, the implementation of the "Point Merge" procedure by the *Centre en route de la navigation aérienne Nord (CRNA/Nord)* is a system that not only improves the level of safety but also reduces the amount of people overflowed by concentrating noise nuisance at a single point for incoming flights to Roissy airport.

The DGAC also deploys continuous descent approach procedures at France's principal airports. By reducing the phases of flight in steps, continuous descent reduces noise pollution and CO₂ emissions around airports. An Airbus A320 descending according to this procedure reduces its acoustic impact by 4 to 6 dB and saves 175 kg of kerosene (or 550 kg of CO₂). The reduction of steps via this approach avoids variations in engine speeds and thus limits environmental nuisance. The average rate of application of these procedures varies between 30% at Roissy and 63% for Basel-Mulhouse airport.

Also in the context of reducing sound nuisance, the PEB is an urban planning document that restricts or prohibits construction in the vicinity of airports. It is developed in cooperation with the environment advisory committee, the *Autorité de contrôle des nuisances aéroportuaires (ACNUSA)*, relevant local authorities and prefectures and the DGAC services. By anticipating the development of traffic, the extension of infrastructures and changes in air procedures over the

coming 15 to 20 years, the PEB thus avoids exposing new populations to sound pollution from aircraft.

Lastly, the system of providing financial aid for soundproofing to airport-area residents is a public policy tool that supports acceptance of aviation activity. Financed by a tax applied to flights out of the areas of France's eleven main airports, it also acts as an incentive for airlines to modernise their fleet of aircraft.

COMBATING GLOBAL WARMING

As regards combating global warming, the government's policy is set on a different time and space scale, since the issue of greenhouse gas emissions generated by civil aviation can only be solved by technological innovation, particularly within the framework of international agreements.

It is precisely in the area of international cooperation on global warming that significant developments have been made in recent years, with increasing action by the International Civil Aviation Organization (ICAO). This action is largely due to the European initiative to include civil aviation in the European emissions trading system, i.e. by recording and restricting rights to emit CO₂ to fly within the European Union, with an obligation on airlines to purchase these rights where applicable. This initiative has greatly contributed to the work of ICAO which, at its next Assembly, should adopt the GMBM and thus make a very significant move forward in international environmental protection.

The last remaining priority is that of emissions of atmospheric pollutants such as nitrogen oxides or fine particulates – a form of pollution that marginally adds to that of other means of transport and is difficult to distinguish, but should be managed. This is another area still greatly unexplored, with local consequences on public health. In recent years, the foundations of a future policy have been laid, particularly with the extended competencies of ACNUSA in this area. It is indeed a major challenge for civil aviation in terms of technological innovation and sustainable development, and one that the DGAC is also working on.

GOVERNMENT SUPPORT FOR R&D

Air transport will grow in the years and decades to come and must innovate to work towards more sustainable aviation. The DGAC participates in this movement by supporting industrialists and by co-operating in national and international work aiming to develop the technologies and operations of the future.

France has a strong aviation industry and plays a pivotal role in the Airbus group. Direct action has been taken in the form of research funding with an allocation of some 100 million euros per year and partnerships created with industry and research.

The DGAC, like other European countries, is involved in the Clean Sky joint technological initiative launched in 2008. This major aeronautical research programme is based on a public-private partnership to develop and accelerate the maturity and validation of disruptive technologies to reduce the ecological footprint of aviation. The second step in the programme began in 2014. Clean Sky 2 is now focusing on in-flight demonstrators and is developing projects such as the test flights of the open rotor engine or the future aircraft for regional transport.

In 2008, France created the Council for Civil Aeronautics Research (CORAC). Based on the model of the Advisory Council for Aeronautics Research in Europe (ACARE), it brings together all French players in the sector (airlines, manufacturers, airports, etc.). The CORAC was created to marshal all aviation industry players around the European goals of improving

the performance of aviation and reducing its ecological footprint. These stakeholders have made major environmental commitments for 2020: reduce CO₂ emissions of air transport by 50%, emissions of nitrogen oxide by 80% and perceived noise by 50%. The CORAC defines and implements the research and innovation actions on five major technology themes: the helicopter of the future, composite aircraft, next-generation engines, extended modular avionics and the all-electric aircraft.

Since the 2010 launch of the technology demonstrators programme, the work done by the CORAC is already creating prospects of reducing fuel consumption by more than 15% compared to the latest generation of engines and decreasing the weight of future aircraft by several hundred kilos thanks to use of composites. A 50% reduction in the portion of non-propulsive energy (used for the aircraft's electrical, hydraulic and pneumatic systems) should also be achieved thanks to optimised management of this energy. The environmental benefits will be perceived as aircraft fleets are gradually renewed.

As aviation currently has no alternative to liquid hydrocarbons, the development of sustainable biofuels has become a priority. In parallel to efforts made by the aeronautical sector to reduce the consumption of next-generation aircraft and helicopters, sustainable alternative fuels are an essential lever in reducing the carbon footprint of air transport. Furthermore, France is the first European country to have developed a network for future aviation fuels.

Placed under the authority of the CORAC and run by the DGAC, the co-ordinating committee for future aeronautical fuels brings together all the relevant French players: the aeronautics sector, airlines, oil companies and research organisations. Its aim is to provide France with a shared vision in this field and to co-ordinate efforts in researching aeronautical fuels. ■

Key figures 2015

- › 239 penalties for environmental offences with €3.3 million in fines
- › Domestic air transport accounts for 1.4% of total CO₂ emissions in France
- › The Continuous Descent Approach (CDA) represents a reduction of 2 to 5 decibels
- › In 50 years, CO₂ emissions have been reduced by 70%

Patrick Gandil has spent his career within the French Department of Public Works and Transport in several positions at headquarters and regional offices, with an exception from 1995 to 1997 when he was Deputy Director in the Cabinet of the Minister for State Reform, Decentralisation and Public Services. From 1979 to 2005, he held a number of high-level positions in this department: as Deputy Director of the regional office of "Haute Saône" (1981 to 1984), and Director of "Val d'Oise" (1994 to 1995), before heading the Airports Department at the DGAC (1997 to 1999) and the Roads and Highways Directorate (1999 to 2003). He was then called to the cabinet of the Minister where he acted as Head of Cabinet from 2003 to 2005. Mr Gandil was promoted to the post of Director General of Civil Aviation in 2007. He is currently also President of the Provisional Council of EUROCONTROL. Mr Gandil graduated from the École polytechnique in 1975, and from the École nationale des Ponts et Chaussées in 1980, where he later gave classes from 1986 to 1996. He received the distinction of "Chevalier de la Légion d'honneur" in 1999 and "Officier de l'ordre national du mérite" in 2007. Mr Gandil holds a private pilot's licence.

Aviation and climate change in the context of the United Nations Sustainable Development Goals: how ICAO addresses climate change



Jane Hupe

Deputy Director, Environment, International Civil Aviation Organization (ICAO)

On 25 September 2015, the United Nations Sustainable Development Summit in New York marked the adoption of the 17 United Nations Sustainable Development Goals (UN SDGs). The UN SDGs set a joint roadmap for all United Nations agencies to contribute and transform the world by 2030. In this article, Jane Hupe describes how ICAO addresses 10 SDGs, which urge the international community to “take urgent action to combat climate change”.

As a specialised agency of the United Nations, the International Civil Aviation Organization (ICAO) is committed to contributing to the achievements of the SDGs. In fact, ICAO’s Strategic Objectives are strongly linked to 10 of the 17 SDGs. The Organization is working in close cooperation with States and other UN bodies to support related targets, and is supporting these goals as an official observer on the Inter-agency and Expert Group on Sustainable Development Goal Indicators.

In particular, SDG 13 aims to “take urgent action to combat climate change”, defined in the outcome document of the Rio+20 Conference as “an inevitable and urgent global challenge with long-term implications for the sustainable development of all countries”.

It is useful to put aviation into context within the framework of sustainable development. Interna-

tional aviation contributes to all three pillars of sustainability. From a societal perspective, going back to ICAO’s founding document, the Chicago Convention, it was recognised that “the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world”. Today, more than 3 and a half billion passengers per year are safely transported by air worldwide, supporting 62.7 million jobs. Aviation and the societal benefits that it offers are forecast to grow at more than 4.5%. In terms of the economy, aviation has a 2.7 trillion dollar global economic impact, supporting up to 3.5% of global domestic product, with 35% of world trade being carried by air. Aviation is a fast, reliable and safe mode of transportation and there are no comparable alternatives for long-haul passenger transport.

According to the United Nations’ scientific body on climate change, the Intergovernmental Panel on Climate Change (IPCC), international civil aviation is currently responsible for 1.3% of global CO₂ emissions. Despite significant investment in improved aircraft technology and air traffic management, aviation emissions, are forecast to increase in the coming decades as the demand for air travel will continue to grow at a rate of around 5% each year.

► Basket of measures to reduce aviation emissions

ICAO and its Member States are actively addressing CO₂ emissions from international aviation by developing and facilitating the implementa-



Figure 1: ICAO’s Strategic Objective on Environment is strongly linked to 10 of the 17 United Nations Sustainable Development Goals (SDGs.)

Aviation and climate change in the context of the United Nations Sustainable Development Goals: how ICAO addresses climate change

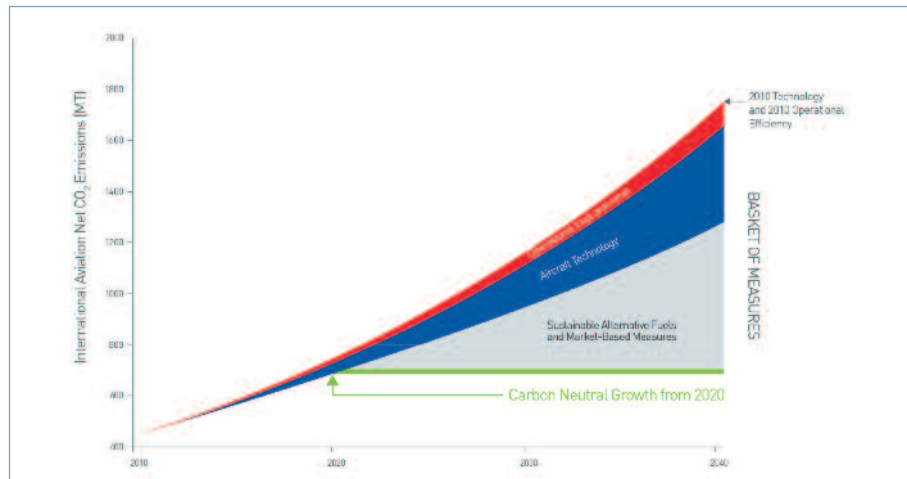


Figure 2: Contribution of measures for reducing international aviation net CO₂ emissions

tion of “a basket of mitigation measures” (Figure 2) in order to achieve ICAO’s global aspirational goals for the international aviation sector of improving fuel efficiency by 2% per year and keeping its CO₂ emissions from 2020 at the same level (carbon-neutral growth from 2020). ICAO is unique in providing current, consensus trends regarding the potential emissions from international aviation. These trends are updated every three years and have been consistently accepted by the ICAO Assembly as the basis for decision-making on matters related to aviation environmental protection.

Advances in aircraft technology have demonstrated their potential to deliver significant environmen-

tal benefits. The aircraft being built today are 70% more fuel efficient than the first generation of jet aircraft and the combination of aircraft technology and operational improvements has enabled a 40% improvement in aviation fuel efficiency globally over the past 20 years alone. The challenge is in continuing to achieve such an impressive rate of progress. ICAO Member States adopted a Global Air Navigation Plan that outlines a performance improvement and technology roadmap towards more efficient operations, through the ICAO Aviation System Block Upgrades (ASBUs).

While technological and operational improvements are well under way in the medium and long

term, the real game-changer for aviation, a sector fully reliant on liquid fuel, is the use of clean, sustainable energy sources such as drop-in alternative fuels. Five alternative fuel production pathways have already been approved, enabling the operation of more than 2500 commercial flights by 23 airlines. By the end of 2016, it is expected that 5500 flights will have flown on alternative fuels. Oslo airport in Norway recently became the world’s first “bioport”, offering 2.5 million litres of aviation biofuel annually to its users, followed by a similar initiative at Los Angeles airport in the United States. Fifty-nine States representing 79.2% of global air traffic have indicated in their action plan on CO₂ emissions re-



Figure 3: GFAAF map of initiatives on aviation alternative fuels



Figure 4: CAEP/10 leadership, which helps ICAO fulfil its mandate on aviation environmental protection. In all, this meeting hosted over 270 experts from all regions of the world.

duction activities that they will pursue investments in sustainable alternative fuels for aviation, while 37 States representing 34.8% of global RTK (Revenue Tonne Kilometre) intend to engage in clean and renewable energy use at airports.

Since the technical feasibility of alternative aviation fuels is proven, integrated thinking and cooperation are now required to enable their large-scale production. ICAO is focusing its efforts on setting the right policy framework to allow for the full deployment of sustainable alternative fuels in aviation and continues to support its States and stakeholders in their efforts to develop and deploy these fuel for aviation, including regular updates to the ICAO Global Framework for Aviation Alternative Fuels (GFAAF)⁽¹⁾ and the projection on future production of such fuels and their lifecycle environmental benefits.

2016 is an important year for international aviation emissions, starting with an historic milestone for the aviation sector: the recommendation by the ICAO Council Committee on Environmental Protection (CAEP) on a new global CO₂ certification standard for aeroplanes. Following six years of analysis by the experts nominated to CAEP, it is the first global design standard for CO₂ emissions for any sector. The standard guarantees up to a 10% fuel efficiency improvement for each new type developed after 2020, relative to the average of current production aircraft types. It also addresses those air-

craft that are already in-production. Those types that have not complied with the standard by 2028 can no longer be produced. For context, approximately 40% of current production aeroplane type designs will need to be improved to meet the standard they currently do not, or they will go out of production by 2028.

The aggregate environmental benefit to be achieved from improvements in aircraft technology, air traffic management and sustainable alternative fuels will be insufficient for the aviation sector to reach its aspirational goal of carbon-neutral growth from 2020. Thus, the 38th Session of the ICAO Assembly in 2013 decided on the need to develop a global market-based measure (GMBM) scheme for international aviation for decision at the 39th Session of the ICAO Assembly in September this year, and ICAO and its Member States are in the process of developing it.

Although States unanimously agreed in 2013 on the development of the GMBM, they held differing views on the design and implementation features of a global scheme. Therefore, a process was devised with the objective of building the necessary technical and political basis for a proposal that would be agreeable by all States. The ICAO Council established the Environment Advisory Group (EAG), whose deliberations formed the basis for a draft Assembly resolution text on a GMBM. Such text was further refined by

two meetings of a High-level Group on a Global MBM Scheme (HLG-GMBM) established by the Council, as well as by a High-level Meeting which identified areas of agreement as well as key issues to be further discussed. States were also invited to undertake bilateral and multilateral discussions to progress in the definition of the GMBM scheme.

As a means to ensure the full engagement of States and other stakeholders throughout this process, ICAO organised a series of Global Aviation Dialogues (GLADs) on MBMs in 2015 and 2016, which familiarised and informed participants about the proposed draft Assembly resolution text and provided opportunities to receive feedback. In addition, work on technical aspects of a global MBM scheme (e.g. monitoring, reporting and verification (MRV), emissions units criteria (EUC) and registries) was undertaken by CAEP to support the discussion.

All these efforts are aimed at providing the next ICAO Assembly not only with a proposal for a GMBM scheme, but also with the related implementation plan, to be agreed upon by the Assembly. A robust plan with clear next steps needs to be prepared with an indication of roles and responsibilities within the GMBM, as well as with the identification of areas where States will need support and capacity building, due to the limited time available prior to 2020.

(1) www.icao.int/altfuels

► Outreach, assistance and capacity building

Capacity building has been the core for action to address international aviation's CO₂ emissions. Since the 37th Session of the ICAO Assembly in 2010, ICAO has encouraged its Member States to voluntarily submit their action plans for emissions reductions from international aviation. Since that time, ICAO has been working on a comprehensive strategy to strengthen national capacities on environment and, specifically, to reduce the impact of international aviation on climate change. This included developing and promoting guidance and technical material, and organising capacity-building seminars in all ICAO regions to facilitate the development of State action plans on CO₂ emissions reduction activities.

ICAO updated its Doc 9988, Guidance on the Development of States' Action Plans on CO₂ Emissions Reduction Activities, including the incorporation of 'Rules of

Thumb', which simplify the methodologies for the calculation of emission reduction benefits for inclusion in the action plans. The emissions quantification elements of Doc 9988 have also been automated in a software tool known as the ICAO Environmental Benefits Tool (EBT). EBT is one of a series of tools that ICAO has developed to provide unbiased information regarding the CO₂ emissions associated with international aviation as well as a means to quantify the potential to reduce those emissions through mitigation measures.

As of June 2016, 95 ICAO Member States representing more than 88% of international traffic voluntarily developed and submitted an action plan to ICAO, reaching the target of 50% more action plans submitted compared to three years before⁽⁵⁾. ECAC States have been responsive to the initiative, as 41 States have voluntarily submitted an action plan to date. Such com-

mitment definitely sets the ground for exemplarity and ICAO is working in close partnership with its EUR/NAT Regional Office in Paris, as well as with the ECAC Secretariat, to provide the assistance needed for States to submit fully quantified action plans.

A key element of ICAO's assistance and capacity-building strategy is forming joint partnerships to facilitate the development of Member States' action plans to reduce aviation emissions. It encourages States that have submitted their action plans to build partnerships with other Member States that have not. The "Buddy Programme" is an instrumental step to enhancing the submission of State action plans and to make sure all avenues are explored to multiply their effects.

Beyond providing assistance for the development of action plans, ICAO has actively worked to facilitate access to financial resources to enable not only the development of action plans, but also the implementation of measures to reduce CO₂ emissions.

In 2013, ICAO established the first such partnership with the European Union: a joint assistance project on capacity building for CO₂ mitigation from international aviation in 14 selected States, 12 of which from the African region and 2 from the Caribbean region.

The main objectives of the ICAO-European Union project are to support the development and submission of States' action plans on emissions reduction; set-up

ICAO Tools

- In order to facilitate the quantification of carbon emissions from air travel and potential mitigation measures, ICAO developed a suite of tools that are available to the public on its website.
- The most popular of these tools is the ICAO Carbon Emissions Calculator⁽²⁾, which allows passengers to estimate the emissions associated with air travel. The calculator completed a major update in June 2016 to integrate the best publicly available data and methodologies. A new module for the carbon calculator is currently in development that will allow users to estimate the emissions associated with air cargo shipments as well.
- In response to a request from the UN network of travel offices, ICAO developed the ICAO Green Meetings Calculator⁽³⁾. This decision-making support tool helps to determine locations for meetings that will minimise participants' emissions from air travel.
- The tool suite is rounded out with the ICAO Fuel Savings Estimation Tool (IFSET)⁽⁴⁾, which was originally developed in order to assist States in estimating fuel savings associated with operational changes in a manner consistent with the models approved by CAEP and aligned with the revised ICAO Global Air Navigation Plan. Today, it is not only used by States in all regions, it has also been included in the curriculum in a number of civil aviation university programmes.

(2) www.icao.int/cc

(3) applications.icao.int/igmc

(4) www.icao.int/environmental-protection/Pages/Tools.aspx

(5) www.icao.int/environmental-protection/Lists/States_Action_Plans/AllItems.aspx

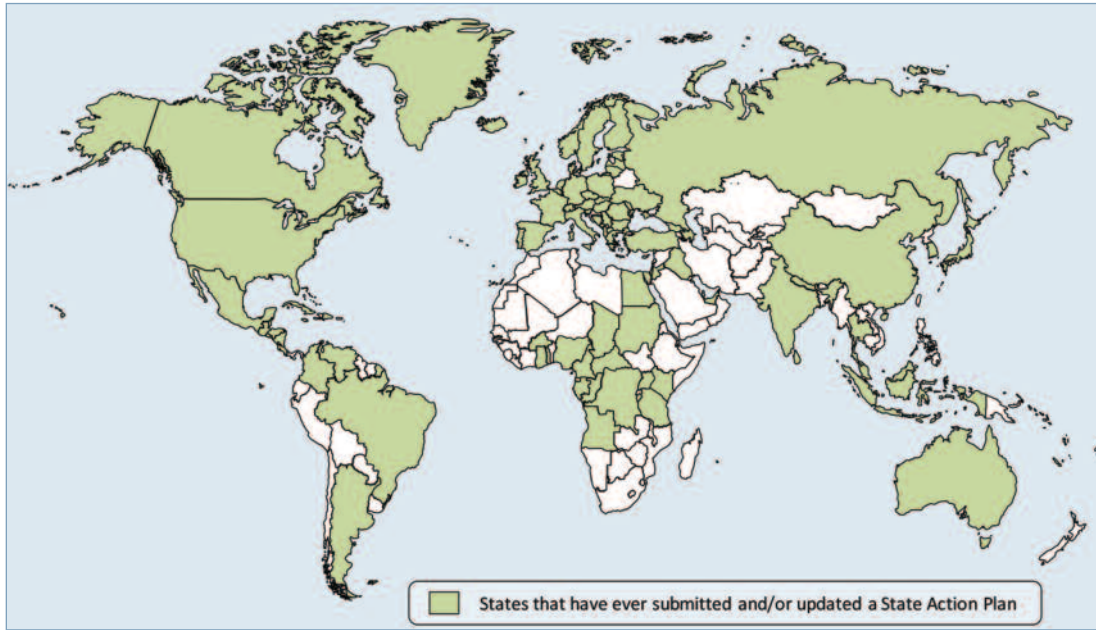


Figure 5: 95 States have submitted an action plan (June 2016)

Aviation Environmental Systems (AES), a monitoring, reporting and verification (MRV) tool to collect data, establish emissions inventories and monitor CO₂ emissions from aviation at the national level; and implement measures to reduce fuel consumption and aviation emissions. The results of this

project and the pilot measures will become practical examples of concrete actions to address CO₂ emissions from aviation and could be replicated in other States that are also requesting assistance to implement their action plans and to establish robust emissions monitoring systems.

A partnership was also established with the United Nations Development Programme (UNDP) with financing from the Global Environment Facility (GEF) to undertake a global capacity-building project – including the implementation of a pilot project on renewable energy in Small Island Developing States (SIDS).

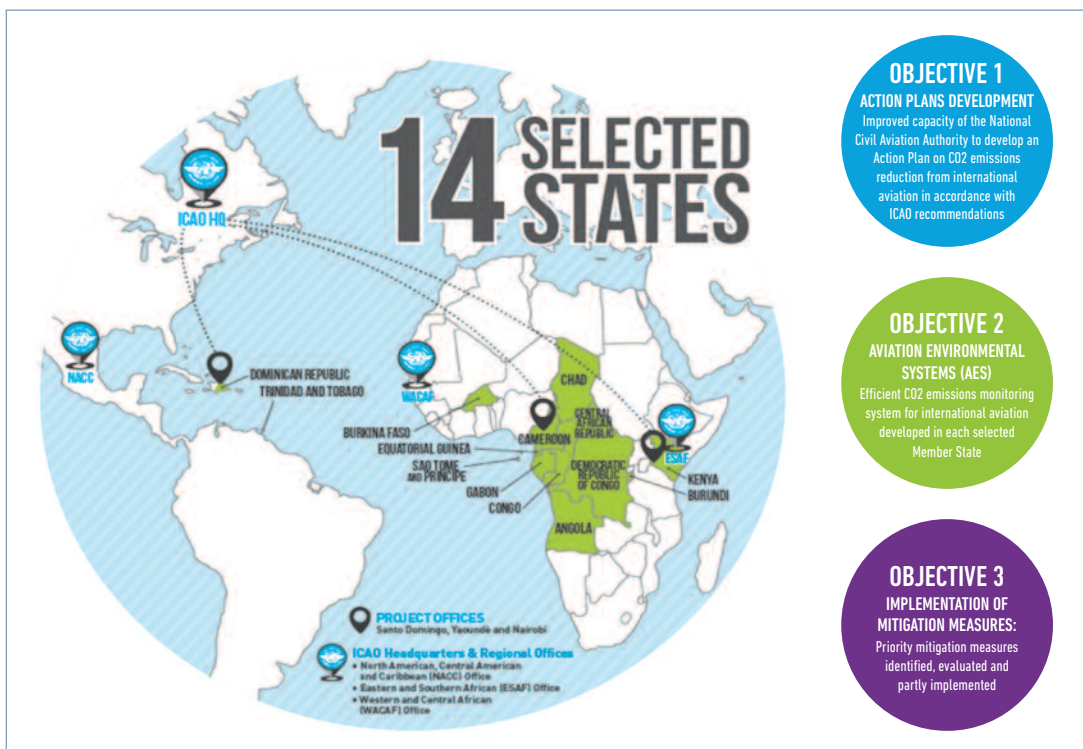


Figure 6: ICAO-European Union joint assistance project

Aviation and climate change in the context of the United Nations Sustainable Development Goals: how ICAO addresses climate change

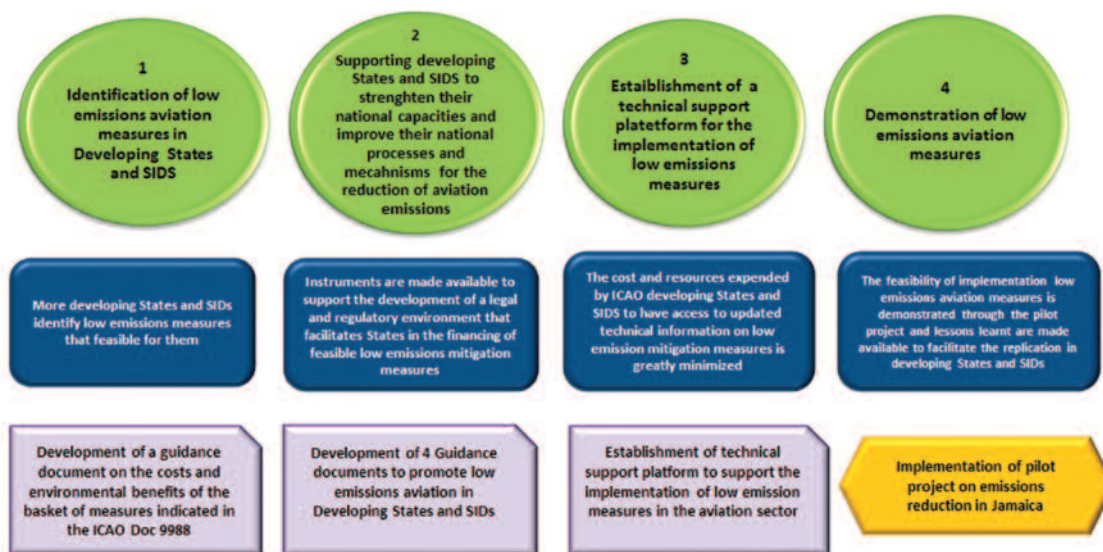


Figure 7: GEF/UNDP four project components

The ICAO-UNDP-GEF project will deliver measureable CO₂ emissions reductions from international aviation in developing countries and SIDS, as illustrated in Figure 7. A key component of this initiative is the implementation of a pilot project, which could be replicated in other SIDS, thus multiplying environmental benefits. Indeed, based on the information provided by ICAO Member States in their action plans on CO₂ emissions reduction activities, 37 States representing 34.8% of global RTK in-

tend to engage in clean and renewable energy use at airports, which demonstrates the potential for the pilot project to be replicated.

The action plans being developed and related assistance projects illustrate how the ICAO *No Country Left Behind* initiative is helping States to implement the full basket of measures for CO₂ emissions reduction.

The year 2016 was off to a strong start with the recommendation on the aircraft CO₂ standard. All eyes will again be on ICAO later

this year as the global MBM for international aviation is discussed. These successes will allow international aviation to deliver on the objective of environmental sustainability and to continue providing societal and economic benefits to the world. In the words of Peter Drucker, “the best way to predict the future is to create it,” and this is exactly why we are working tirelessly at ICAO on a sustainable aviation future. ■

Jane Hupe is ICAO's Deputy Director of the Air Transport Bureau, responsible for the environmental programme of the Organization. Ms Hupe has been at the forefront of ICAO's efforts to define and promote policies and standards for an environmentally sustainable aviation that encompasses aircraft noise and aircraft engine emissions, local air quality and climate change, sustainable energy and market-based measures. Her responsibilities include directing ICAO environmental activities, and serving as the Secretary of the ICAO Council's Committee on Aviation Environmental Protection (CAEP). Ms Hupe co-ordinates aviation and the environment activities with other international organisations and is also in charge of the strategy on assistance and capacity building of ICAO Member States in this area.

European comprehensive approach to mitigation of climate change

Béatrice Adoléhoumé

Environment and Technical Officer,
ECAC Secretariat



How is Europe tackling aviation's impact on climate change and pursuing the aspirational goal of carbon-neutral growth by 2020? Béatrice Adoléhoumé describes Europe's strategy and commitment to address this key issue.

International aviation represents a relatively small contribution to climate change. According to the report of the Intergovernmental Panel on Climate Change (IPCC) on *Aviation and the global atmosphere (Ed.1999)*, aircraft operation contributes to climate change approximately in proportion to its contribution to radiative forcing, which represented about 3.5% of the total radiative forcing by anthropogenic activities in 1992.

The historic agreement reached in Paris in December 2015 at the 21st Conference of the Parties (United Nations Framework Convention on Climate Change – UNFCCC) emanated from a consensus on the acknowledgement that there was a need to maintain the increase in global average temperature well below 2°C above pre-industrial levels, and to aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change. But the sum of all nationally determined contributions from States to the reduction of carbon emissions emitted within their boundaries, following the Paris Agreement, is not yet enough to keep the increase in temperature below 2°C by the end of the century. In this context, no sector can afford to be left behind in the global effort to tackle climate change. International aviation must also address its carbon emissions, in particular in light of the high growth rates of international air traffic - and it has already undertaken to do so.

In 2009, an agreement was reached in ICAO on a so-called *aspirational goal* to keep international aviation emissions at their level of 2020. In other terms, whatever the traffic growth, the increase in traffic should remain carbon neutral as of 2020.



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But it may be worth stressing that the stabilisation of CO₂ emissions does not mean a stabilisation of temperatures, on several grounds.

Firstly, carbon-neutral growth disregards the other climate effects of international aviation (ozone, formation of contrails, aircraft-induced cirrus cover, etc.), which have not been addressed to date. Within the ECAC group on the Abatement of Nuisances Caused by Air Transport (ANCAT), European aviation experts are being kept

abreast of the latest scientific developments on the understanding of the non-CO₂ effects of international aviation, but additional research is needed in this area (although some operational measures have already been explored in relation to cirrus-clouds⁽¹⁾).

Secondly, CO₂ emissions do not have only instant climate effect, as they remain in the atmosphere on long timescales. From a study undertaken at Manchester University, "30% of an emission decays within the first 30 years, 50% of an emission decays on a timescale of hundreds of years, and 20% of their effect remains for millennia after the emission has stopped"⁽²⁾. As a consequence, concentrations of carbon dioxide keep increasing in spite of the stabilisation of net emissions. Therefore, in light of the approximately linear proportionality between cumulative emissions and temperature response⁽³⁾, temperature also continues to increase. This stresses the need for early action in terms of effective reduction of emissions from international aviation, and also leads to considering higher levels of global ambition in the future, beyond carbon-neutral growth.

(1) Aviation-induced cirrus cover detected from diurnal cycle over North Atlantic August 2012 Graf, K., U. Schumann, H. Mannstein, and B. Mayer (2012), Aviation induced diurnal North Atlantic cirrus cover cycle, *Geophys. Res. Lett.*, 39, doi:10.1029/2012GL052590.

(2) Quote from "The impact of the 2020 Carbon Neutral goal on aviation CO₂ radiative forcing and temperature response", D.S. Lee, L.L. Lim, and B. Owen, Dalton Research Institute, Manchester Metropolitan University, September 2013, available at <http://www.cate.mmu.ac.uk/projects/>

(3) See reference in footnote 1

► European comprehensive approach to tackling the climate change effect of international aviation

Mindful of this cumulative effect of CO₂ emissions, European States took early actions in order to fight against the climate impact of their international flights. The actions taken in the last decade, which continue to deliver their benefits, were taken both at the national and at the regional levels, in a complementary manner. They are presented in the 41 national action plans for emissions reductions from ECAC States, which have been submitted to ICAO since 2012. Twenty-two of these plans were updated over the summer 2016.

The measures presented in the national sections of European action plans also involve a number of actions of a voluntary nature, which were undertaken by stakeholders from the industry. Amongst them, a number of initiatives and experiments relate to the development and the use of sustainable biofuels for aviation. Some of these voluntary actions have already contributed to reducing aviation emissions (at least in relative terms, as compared to a “business as usual” scenario), but the major value of a number of such initiatives and experiments lies in the significant in-sector emissions reductions which they promise to deliver in the long run, once deployed on a large scale.

Most of these European action plans are publicly available on ECAC’s website <https://www.ecac-ceac.org/action-plans-publicly-available>. The significant amount and the variety of the actions taken throughout ECAC States demonstrates the European commitment to actively fighting against climate change, via a comprehensive approach, involving all the measures of the so-called “basket of measures” developed within ICAO in 2009⁽⁴⁾. One of the specificities of European action against climate change is that it consists of a number of coordinated actions taken at the regional level, most of which were taken within the European Union.

This regional approach has allowed for synergies and improvement in the efficiency of the related measures, in light of their consistency throughout the region and of scale economies provided. These regional measures are presented in a section of national action plans that is common to action plans of all ECAC States, and available at the following link: <https://www.ecac-ceac.org/documents/10189/50084/Common+section+for+European+State+Action+Plans+10+June.pdf/182b4ba3-01e0-4c05-a1b4-e425f87a928d>.

“In-sector” emissions reductions

Most of these measures aim for so-called “in-sector” emissions reductions. In other terms, they aim to reduce the amount of emissions effectively resulting from aircraft operation. But Europe has also initiated a measure to further reduce emissions from its international air traffic, via the carbon market (European emission trading scheme).

These in-sector measures consist of:

- (i) aircraft-related technology developments, including research/development activities undertaken in the framework of the Clean Sky Joint Technology Initiative (European Union), which, for example, aim to demonstrate the benefits of advanced and innovative airframe structures, novel engine integration strategies, innovative fuselage structures, etc.;
- (ii) sustainable biofuels for aviation and the “European advanced biofuel flight-path” (European Union), which aims to achieve the commercialisation of sustainably produced biofuels in the aviation sector by reaching a 2 million-tonne consumption by 2020;
- (iii) improved air traffic management and infrastructure use, including the Single European Sky Initiative of the European Union and the Single European Sky ATM Research (SESAR).

But these measures all together are not sufficient to stabilise international aviation emissions, at least in the short run. A number of technological developments are promising but have not reached a sufficient level of maturity and availability on a sufficiently large scale (such as biofuels).

Against that background, and in light of the earlier-mentioned emergency to limit the release of carbon emissions in the atmosphere, the sector must explore options beyond in-sector emissions reductions.

► The potential of the carbon market: the need for a global GMBM scheme

Seizing the opportunities offered by the carbon market⁽⁵⁾ is certainly one of the options worth exploring. The principle is well known and rather simple, in theory. Indeed, other sectors of the economy benefit from already available “clean” or “carbon-sober” technologies, which would allow them to reduce their emissions even beyond the reduction objectives assigned to them, if any. Some sectors even benefit from very low “abatement costs” (cost of reduction of their CO₂ emissions), much lower than in the aviation sector. Also, under the UNFCCC system some sustainable projects (i.e. forestry) in developing countries have, under specific conditions that guarantee the permanence of the emissions reductions over time and their effectiveness, and which also guarantee no double-counting or double-claiming of the carbon absorption or carbon reduction, allowed for effective emissions reductions, for which

(4) ICAO basket of measures, in the report of the Group on International Aviation and Climate Change (GIACC), 1 June 2009, available at http://www.icao.int/environmental-protection/GIACC/GiaccReport_Final_en.pdf,

(5) Link to UN movie presenting the basics of the carbon market https://www.youtube.com/watch?v=B2zbaExs_B0

they were delivered “carbon credit” (this is the case of the well known Clean Development Mechanism). Each carbon unit is worth one tonne of CO₂ effectively reduced.

To illustrate the potential “virtuous” principle behind an offsetting scheme for aviation: in buying such a carbon credit, an aircraft operator would effectively reduce by one tonne the overall amount of emissions in the atmosphere, thus “neutralising” the impact of the effective emission of one tonne which resulted from the operation of its aircraft. This is a win-win situation: the operator can continue to expand its activity - although neutralising the climate effect of its increase in activity - while financially supporting the clean development of a developing country; it is the purchase of the carbon credit which allows for the offset of its additional emissions.

This is a virtuous dynamic whereby the aviation sector can continue to increase its activity and meet the growing demand in air transport, at the same time stabilising its “net” carbon emissions and supporting the clean and sustainable development of developing countries.

The additional value of carbon offsets is that they are immediately available and allow for the effectively needed early action already mentioned.

When applied to international aviation, some aspects of a market-based measure are challenging, in particular in light of the principles of non-discrimination and non-dis-

tortion that prevail in the Chicago Convention. Also, special circumstances and the capabilities of States must be taken into account. In that context, a global system is appropriate. There are positive signs that an agreement will be reached at the upcoming ICAO Assembly in September/October 2016, which would allow the aviation sector not to be deprived of this cost efficient manner of achieving CO₂ emissions reductions as soon as possible and at the lowest cost possible, which many other sectors of the economy have been using for years.

There has never been such a widely-shared expectation through-

out the world (including from airlines and other stakeholders from the industry and from environmental NGOs, as well as from a number of States and regions) that a worldwide agreement be reached at the upcoming ICAO Assembly on the key design elements of a global market-based measure that would help deliver the carbon-neutral growth of international aviation as of 2020 in a complementary manner to the other elements of the basket of measures that contribute to in-sector emissions reductions. Europe has been fully committed to its development, and will remain committed to its implementation by 2020. ■

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Béatrice Adoléhouné is responsible for environmental and safety matters at the ECAC Secretariat. She joined the Secretariat in 2009, where she has been supporting the co-ordination of European contributions to ICAO work on the environment and leading the development of various guidelines, in particular for the submission to ICAO of 41 European action plans for CO₂ emissions reductions. Before joining ECAC, Ms Adoléhouné successively headed the environmental unit at the French Directorate General of Civil Aviation, the “Global Public Goods” Unit at the French Ministry of Environment, and the “General Economic Studies” Unit at the Directorate General for Infrastructure at the French Ministry of Transport. She devoted the first half of her career to developing countries, initially as a researcher in economics, dealing with urban transport in developing countries such as Brazil, Egypt and in several countries of Sub-Saharan Africa, and then as a project leader, co-ordinating the implementation of development projects in the transport domain. A civil engineer of the French Ministry of Transport, Ms Adoléhouné also has a postgraduate diploma in international economics and economics of development.



A global market-based measure for aviation

Urs Ziegler

Head Environmental Affairs Section, Federal Office of Civil Aviation, Switzerland, Chairman of the ECAC/EU Co-ordination Group on Market-Based Measures (MBM-CG) & of the ECAC/EU Co-ordination Group on Aviation and Climate Change Action Plans (ACCAPEG)

It is beyond any doubt that aviation is a key contributor to global economic prosperity and societal development. Key figures published by the Air Transport Action Group ATAG⁽¹⁾ underline this fact in an impressive manner: aviation's global economic impact is estimated at 2.7 trillion USD per year and it supports more than 60 million jobs worldwide. 3.5 billion passengers are transported every year and the total value of goods transported by air represents 35% of all international trade. But these impressive achievements do not come at zero environmental cost. Chairman of the ECAC/EU MBM-CG Urs Ziegler gives an overview of the steps towards the development of a global market-based measure and the role of ECAC in this process.

Aircraft noise emissions remain a significant cause of annoyance for the population living in the vicinity of airports and thus represent an important hindering factor for the operation and expansion of airports. The operation of aircraft may also have a significant impact on the local air quality via the emissions of air pollutants such as oxides of nitrogen, hydrocarbons, carbon monoxide and particulate matter. In addition, the combustion of fossil and partly also of alternative fuels by aircraft has a significant impact on the global climate and related impacts and potential damages. The principal gases emitted by aviation are carbon dioxide (CO₂) and water vapor (H₂O). They directly impact radiative forcing while emissions of nitrogen oxides and particulate matter have an indirect impact on the balance of the earth's radiation budget. CO₂ emissions represent the most important climate contribution of aviation and they are forecasted to grow significantly in the coming years (Fig 1). Reducing the impact of aviation on climate change therefore has to start by taking action and thereby reducing the amount of aviation's CO₂ emissions, which currently represent roughly 2% of the global CO₂ emissions from anthropogenic sources.

► Basket of measures

ICAO has recognised the need to take action against the CO₂ emissions of civil aviation as a matter of priority. Since 2009 ICAO has therefore been pursuing a so-called basket of measures to reduce aviation CO₂ emissions, which includes the development and implementation of a CO₂ standard for new and in-production aircraft, the development of the Contracting States' action plans to reduce CO₂ emissions, the

development of guidance documents on operational measures, and initiatives to promote the development of alternative sustainable fuels from non-fossil sources. Since all of these measures are not sufficient to keep aviation's forecasted future CO₂ emissions at the level of ICAO's official goal of carbon-neutral growth from 2020 onwards, the basket also includes the important element of a market-based measure (Fig. 1).

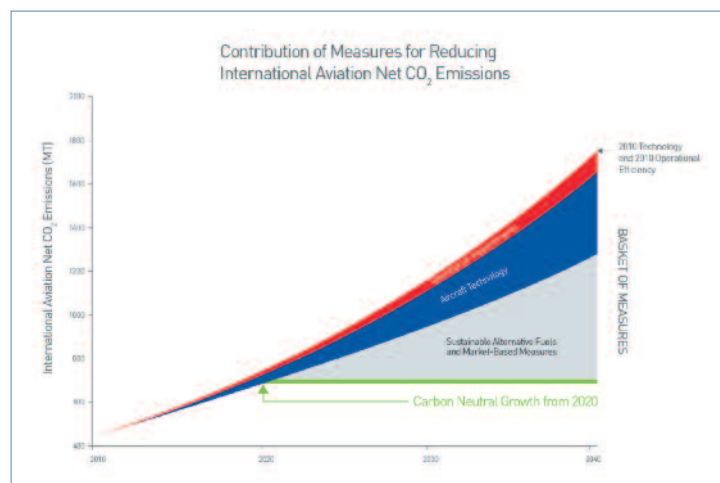


Figure 1: Forecasted growth of aviation CO₂ emissions and role of the basket of measures (Source: ICAO 2016)

► Development of a global market-based measure for aviation

The discussions on the introduction of a market-based measure to reduce the impact of aviation on climate change already started more than 20 years ago within ICAO's Committee on Aviation Environment Protection (CAEP). Over the course of time many theoretically possible pathways such as fuel taxation, emissions-related route charges, emissions trading and offset mechanisms were studied and evaluated by CAEP and subsequently also by the Council of ICAO. In 2013 the 38th ICAO Assembly finally recognised the potential desirability of a global MBM scheme and noted that a single global carbon offsetting scheme, as opposed to a patchwork of State and regional MBMs, was supported by industry. It decided to develop a global MBM scheme for international aviation and it requested the Council to finalise the work on the technical aspects and the environmental and economic impacts of the possible options for a global MBM scheme, including on its feasibility and practicability, and to make a recommendation on such a scheme and the mechanism for its implementation from 2020 onwards for decision by the 39th Assembly in 2016. This recommendation should *inter alia* also address the special circumstances and respective capabilities of (developing) States while minimising market distortions.

Following the decision of the 38th ICAO Assembly, the Council created the Environmental Advisory Group (EAG) composed of 17 Council Members, which was tasked with the actual development of a proposal on an MBM. This political group was supported by CAEP, which provided a substantial amount of analytical and technical input on all aspects of the MBM options discussed by EAG.

Once it became clear that the basic option to be pursued in the future would be a pure offsetting scheme without generation of revenue, EAG initially developed, together with the ICAO Secretariat, a so-called 'Strawman' comprising

possible elements that could become part of the MBM to be developed. This 'Strawman' allowed for the analysis of all kinds of variations of the core elements of such an MBM based on offsetting by the CAEP Global Market-Based Measures Task Force.

The results of this analytical work demonstrated that according to the range of emissions forecasts developed by CAEP in 2013, the quantity of CO₂ emissions to be offset in order to reach the goal of carbon-neutral growth from 2020 onwards would range from between 142 and 174 million tonnes of CO₂ in 2025 and 443 and 596 million tonnes of CO₂ in 2035⁽²⁾ (Fig. 2). The

total cost of offsetting these amounts of CO₂ emissions was estimated by CAEP at between 1.5 and 6.2 billion USD in 2025 and between 5.3 and 23.9 billion USD in 2035 using a spread of possible future carbon prices as published by the International Energy Agency IEA⁽²⁾ (Fig. 3). These costs would represent 0.2 - 0.6 % in 2025 and a maximum of 0.4 - 1.5 % in 2035 of total forecast revenues from international aviation⁽²⁾.

Based on the extensive studies and discussions undertaken so far, the President of the ICAO Council finally issued a draft Assembly resolution text that first of all served as a basis for discussions in a High-level Meeting convened in Montreal in May 2016 and which, with minor changes, continued to be the basis for discussions and negotiations until shortly before the

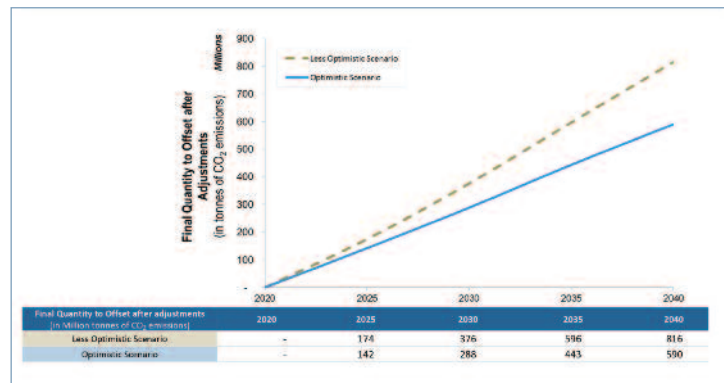


Figure 2: Emissions to be offset (Source: ICAO 2016)

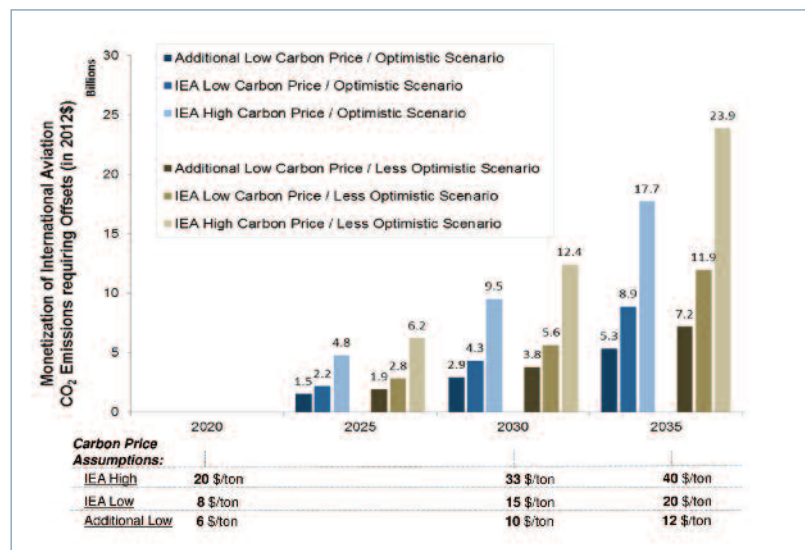


Figure 3: Estimated cost for aviation (Source: ICAO 2016)

39th Assembly⁽³⁾. The scheme proposed by ICAO Council President Aliu calls for the participation of States with a high aviation activity and with considerable economic strength from the beginning of the scheme in 2021, while States with lesser aviation activities and economic strength would be expected to join five years later. Least Developed Countries, Small Island Developing States and Land-Locked Developing Countries shall be ex-

empted from the scheme. In order to avoid market distortion, the inclusion of States will be based on a route-based approach: all routes between States that are included in the scheme are subject to offset obligations, while emissions on routes connecting at least one State which is exempted from the scheme are also exempted from offsetting obligations. The resulting offsetting obligations for the operators shall be distributed according

to a 100% sectoral approach: every operator has to offset the same percentage of its emissions with this percentage being calculated on the basis of the level of aviation's CO₂ emissions above a 2020 baseline. The offsetting obligations shall be completed with offsetting instruments/emissions units which are developed taking into account the developments in the UNFCCC and under the Paris Agreement.

► Role of ECAC

European positions were co-ordinated on an ECAC-wide basis throughout the discussions and negotiations on the development and introduction of a global MBM that have taken place so far. Co-ordination was achieved through the ECAC MBM Co-ordination Group (MBM-CG) under the chairmanship of Klaus Winkler (European Commission, DG MOVE) and Urs Ziegler (FOCA Switzerland), which has met more than 20 times since December 2013. The MBM-CG co-ordinated the work of the European experts in CAEP and its subgroups and provided inputs for the negotiation process in the Council and in EAG as well as for the High-level Meetings held in Montreal so far. The European participants in the various fora strongly supported the process towards the definition of the future global MBM and they did this by speaking with one

voice. Throughout the process they underlined the need for the global MBM to deliver on its climate objective of carbon-neutral growth as of 2020. They defended the position that addressing the specific circumstances and respective capabilities (SRCS) of (developing) States should not lead to a situation where a substantial amount of the CO₂ emissions of international civil aviation was left unaddressed (environmental integrity) and to this end they support the introduction of review clauses allowing adjustment to the scheme during its operations if necessary. Europe also supported the application of a route-based approach which guarantees equal treatment of all operators on the same routes and thus prevents the emergence of discrimination and market distortion between participants in the scheme.

► Conclusion

The tremendous amount of work invested throughout the world in the development of a global MBM has resulted in a robust proposal to be considered by the 39th Assembly in autumn 2016. Left unchanged, President Aliu's proposal would result in a coverage of approximately 85% of the CO₂ emissions of international aviation above its forecasted emissions in 2020 in the period 2020 to 2035. Should the 39th Assembly decide upon the implementation of a global MBM as of 2020, substantial work and related resources will also be needed in Europe to develop and implement the necessary standards and recommended practices allowing for the implementation of the scheme and for the administrative arrangements to be put in place partly well ahead of 2020. ■

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Urs Ziegler began his career in the field of environmental protection with a civil engineering company as well as spending more than ten years with the Swiss Office for Environmental Protection. In 2005, he joined the Swiss Federal Office of Civil Aviation as Head of the office's Environmental Protection Unit. He is the current Swiss CAEP member and was elected as Chairman of this Committee for its triannual meetings in 2010, 2013 and 2016. He also co-chairs CAEP's Modelling and Databases Group and is active in CAEP's task force supporting the Council of ICAO in the development of a global market-based measure. Within ECAC he currently co-chairs the ECAC MBM Co-ordination Group. Dr Ziegler completed studies in natural sciences and acquired a master's degree in public administration.

ANCAT's contribution to sustainable aviation



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Since 1974, the Group of Experts on the Abatement of Nuisances Caused by Air Transport, ANCAT, has been a forum for ECAC Member States to work on an increasing number of environmental topics in Europe as well as in relation to developments in the ICAO Committee on Environmental Protection (CAEP). ANCAT comprises representatives from ECAC Member States, aircraft operators, manufacturers, airports, EUROCONTROL and non-governmental organisations. ANCAT meets on average twice a year to exchange views, discuss the latest developments and provide recommendations to ECAC Directors General, including the results of the work of its two task groups Modelling and Interdependencies Task Group (MITG) and Aircraft Noise Modelling Task Group (AIRMOD).

▶ ANCAT's role

The sustainable development of aviation is increasingly becoming an important policy issue in many States of the ECAC community, where aviation is a key part of the economic activities. Economic development and the consequential increase in demand comes with local and regional environmental effects and puts governments in a position to develop appropriate and effective policy measures. Sometimes this involves cross-border arrangements. For a large number of ECAC States ANCAT has proven to be a valuable source of information offering a platform to share ideas and develop new measures and approaches to be applied not only at ECAC, but also at the global, level. When asked, various State representatives refer to ANCAT as being a key forum reuniting all areas of environment work and offering an excellent opportunity to establish a network for further cooperation with colleagues from ECAC States and to find support in their work on, for example, noise reduction around airports and the development of the use of sustainable alternative fuels.

▶ 2013-2016 in retrospect

In May 2013, when I took over from Philippe Langumier (French DGAC) as Chairman of ANCAT, Europe and ECAC were in the middle of preparations for the 38th ICAO Assembly. The historic decision to work on a global MBM still had to be taken. We could only imagine the amount of work associated with it both at a European as well as a global level and involving many experts from ECAC States. At that time, the on-going ICAO CAEP programme already required a lot of European resources and would become even more intense towards the CAEP/10 meeting in 2016, where key decisions were to be made.

Given this forecast, my aim was to involve experts from a wider group of States throughout the ECAC community and dedicate meetings to specific environmental topics when current affairs required more attention and in-depth knowledge. Planning ANCAT meetings away from the ECAC offices in Paris and with the help of local authorities proved an effective approach. Meetings were held in Kiev, Bucharest and Rome and an increased attendance was noted.

An excellent example of addressing a special topic was the

meeting in Rome in spring 2014, when attention was paid to the development of a GMBM. It proved to be both timely in terms of engaging some high-level experts as well as of calling the attention of Member States to consider their involvement in the process. Industry and NGOs also showed an increasing involvement. ANCAT meetings thus became platforms for exchanges of views on the latest technological developments in European and global industry and at the same time engaging the concerns of civil society.

Over the past three years, ANCAT has continued working in parallel with its two standing task groups: Modelling and Interdependencies Task Group (MITG) and Aircraft Noise Modelling Task Group (AIRMOD). MITG worked in the perspective of the development of a wider European approach to modelling, undertaking to contribute to an inventory of European environmental modelling activities. AIRMOD made a huge effort in the development of ECAC Doc 29, modelling of noise impact around airports, which also became the basis for a global ICAO standard (Doc 9911).



Meeting of the ANCAT Group of Experts, March 2015

▶ Involvement in global environmental issues

With a limited number of ECAC States as members (France, Germany, Italy, Netherlands, Poland, Spain, Sweden, Switzerland, Ukraine and United Kingdom) or observers (Greece, Norway, Turkey) of CAEP, non-CAEP States see ANCAT as a “gateway” to the developments in ICAO’s environmental work. This information is an essential basis for building support for the CAEP work from the wider ECAC community in working groups, and in particular for decisions made in the ICAO Assembly.

Some members of ANCAT were also heavily involved in the development of the CO₂ standard and

the particulate matter standard, on both of which CAEP reached a commonly agreed proposal to the ICAO Council.

In this article, the development of ICAO Doc 9911 and ANCAT’s involvement in the work on a global MBM has already been mentioned. ANCAT made possible a wider involvement of European States in the CAEP Global Market-Based Measure Task Force (GMTF). The intensity of the work on this topic and the density of meetings at global and European levels during the first half of this year, specifically of the European MBM-co-ordination group, even forced ANCAT to drop its spring meeting.

▶ Future work

At the 39th ICAO Assembly a key decision will once again be taken, this time on the result of the past three years’ work on a global market-based measure. Depending on the outcome of the decision, the coming years will need to focus on the implementation and legal aspects of a global system. ANCAT will inevitably spend time on this issue. At the same time many more topics will remain and demand our attention. ANCAT members, when asked about their expectations, see an increasing interest in the development of sustainable alternative fuels, further attention paid to noise issues at airports and helicopters and drones, as well as the implementation of decisions taken by CAEP. All wish to continue the process of cooperation and build further on the effective use of the network between States, industry and NGOs that has been strengthened in the past years. ■

Michael Lunter has been working in the field of sustainable aviation in the Ministry of Infrastructure and the Environment in the Netherlands since 2007. Before entering the aviation world, he worked for various organisations, including the European Commission, on diverse environmental topics in the field of legislation and inspection. In 2012, he took over as CAEP member for the Netherlands. In that role, he co-chairs the meetings of ECAC members of CAEP. He is a member of WG3, which developed the CO₂ standard for aeroplanes, and of the GMBM Task Force that supports the work on the development of a global market-based measure. In 2013, he took over the chairmanship of ANCAT.

Tackling global aviation emissions: a historic opportunity for ICAO

Jos Delbeke

Director General of the European Commission's Directorate-General for Climate Action (DG CLIMA)



International aviation is expected to contribute to global efforts to fight climate change, along with other sectors, says Jos Delbeke, Director General for Climate Action at the European Commission.

With the landmark Paris Agreement, the international community has committed itself to keep global temperature rise this century well below 2°C and to drive efforts to limit the temperature increase even further to 1.5°C above pre-industrial levels. In order to live up to this challenge, all countries and all sectors will have to contribute to the efforts. This also includes international aviation, one of the fastest-growing sources of greenhouse gas emissions, where urgent and bold action is expected.

This sets the tone and context for the next ICAO Assembly, which is just around the corner. If all eyes were on Paris last year, this year they will be looking to Montreal and ICAO to deliver what it agreed back in 2013 – a global market-based measure (GMBM) to stabilise CO₂ emissions from 2020. This is a unique opportunity that cannot be missed. We now need to agree on a robust and effective GMBM that responds to the objective agreed in Paris and that delivers on carbon-neutral growth from 2020 as a first step.

The signs are good: momentum is growing, a lot of preparatory work has been carried out and industry is fully supportive of a robust scheme. The next Assembly offers a historic opportunity that we all need to embrace with a view to sealing a good deal, both for climate and for industry.

I am delighted to have the opportunity in this special climate edition of ECAC News to share a



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number of observations on the GMBM ahead of the ICAO Assembly meeting.

Before going into detail, let's first put things into context and remind ourselves why it is so important to tackle emissions from international aviation. Global emissions from this sector have already doubled compared to what they were in 1990, and are predicted to be seven times higher by 2050. It is clear that if left unaddressed, such a sharp increase in emissions would undermine efforts by countries and other sectors to stay well below a global temperature increase of 2°C compared to pre-industrial levels. It is therefore imperative that international aviation contributes its fair share to the fight against climate change. We need a robust GMBM, knowing that more will be needed in the long term, bearing in mind that the industry has already committed to reducing

its emissions by half by 2050.

As we get close to the Assembly, we can see that a global mechanism is shaping up, thanks to the groundwork over the past years and to the leadership of the President of the ICAO Council. This is good news, though we know that the last steps will be decisive in achieving the deal we need.

While ensuring that aircraft operators are treated equally on the same route is of vital importance, it is also critical to ensure the GMBM is fit for purpose, namely that it delivers on the agreed objective of stabilising international aviation emissions from 2020 as a first step. ICAO's credibility rests on the capacity of the scheme to deliver genuine emission reductions and to meet its own climate objectives.

The EU initially pushed for a higher climate ambition but we eventually agreed to work for carbon neutrality from 2020. Let's



make sure the scheme is fit for that and that its emission coverage matches what is needed to get there over time. This is obviously a key challenge ahead of the Assembly. While we are ready to accommodate some degree of differentiation for a phased implementation of the scheme, consistent with the principle of special circumstances and respective capabilities (SCRC), we must ensure the broadest participation of countries. This is essential to ensure the highest possible coverage.

Differentiation can also be addressed through other complementary avenues, such as offset projects primarily benefitting developing countries, or the provision of technical assistance and capacity building to countries to help with implementation.

As is traditionally the case for many other pieces of legislation, most recently the Paris Agreement, the GMBM will need a solid review clause that will allow its effectiveness to be assessed and improved regularly. This will also enable ICAO Member States to assess how the GMBM is delivering on its objective and how it can be strengthened over time, consistent with the Paris objectives.

Let me also underline the importance we attach to transparency on accounting and compliance. This requires robust monitoring, reporting and verification rules as well as clear criteria to ensure the use of credible emission units to guarantee real emission reductions. These will not be ready by the time the Assembly meets but a roadmap for these rules should be agreed before the scheme takes off. This set of rules is key to environmental integrity and effectiveness.

The EU has been successfully tackling aviation emissions through the EU Emissions Trading System (EU ETS) as part of its broader climate policy and objectives since 2012. But of course aviation emissions don't just concern the EU: global emissions from international aviation must also be tackled. We have been actively engaged in the negotiations under the International Civil Aviation Organization (ICAO) for a GMBM since they began in 2010 and are committed to reaching a global agreement later this year.

Let us now work together at the global level for a robust global market-based mechanism that effectively contributes to the fight against climate change, is inclusive, and non-discriminatory. This is what ICAO crucially needs to deliver this year to show its responsiveness to last year's global climate change agreement in Paris. The EU stands ready to contribute in an active and constructive manner, building on its own experience in this field, and is ready to support others preparing for an ambitious global market-based measure. ■



Jos Delbeke has been the Director General of the European Commission's Directorate-General for Climate Action since its creation in 2010. He joined the European Commission in 1986. Mr Delbeke was very involved in the negotiations on the European Union's 2009 policy package on climate change and energy in the European Council and Parliament. He has been a key player in developing EU legislation on cars and fuels, the Emissions Trading System (ETS), air quality, and emissions from big industrial installations and chemicals (REACH). He has been responsible for developing the EU's international climate change strategy and was for many years the European Commission's chief negotiator at the United Nations climate conferences. Mr Delbeke holds a PhD in economics from the University of Louvain, Belgium, and worked in 1985 at the International Monetary Fund (Washington DC, USA). He has been a lecturer at the University of Louvain on European and international environmental policy since 2013. In 2015, Mr Delbeke co-authored a book entitled *"EU Climate Policy Explained"*, which aims to explain the EU's climate policies in an accessible way.

Industry's engagement on CO₂ emissions reductions

Paul Steele

*Senior Vice President, Member and External Relations,
Corporate Secretary, International Air Transport Association*



Partnership is the key to the aviation industry's approach to addressing the urgent global challenge of climate change. Paul Steele describes the goals the aviation industry set for itself in this matter and its vision to achieve them.

Partnerships drive the aviation industry on a daily basis. Without collaboration across the industry, how would we manage to send 9.8 million passengers on 104 000 flights and carry USD 17.5 billion worth of global trade every single day?

Those flights take place on an impressive 52 000 routes, operated by over 1400 airlines between 3883 airports, using the 26 000 aircraft in today's fleet, guided safely through the skies by 173 air navigation service providers. Modern air transport played a key role in shaping the global world in which we now live. In parallel, we recognise that we need to be a good global corporate citizen in order to earn our licence to grow into the future. This is predicated on strong, proactive voluntary action, backed up by appropriate regulation.

That is why in 2009 the aviation industry set itself its three global goals to address its climate impact:

- a short-term fuel-efficiency goal of 1.5% improvement per year to 2020;
- a mid-term goal to cap net CO₂ emissions through carbon-neutral growth from 2020; and
- a long-term goal to halve aviation CO₂ emissions by 2050.

At the same time, a four-pillar strategy was developed for the industry to deliver on those goals. The pillars of new technology (including sustainable alternative fuels), better operations, improved infrastructure and the implementation of a

single global market-based measure are the foundation stones guiding us towards a sustainable future. In aviation, we need that strategy to be applicable on a global basis because we have to operate on globally agreed standards and systems.

Working in partnership with governments and across the whole aviation industry sector, we have seen significant progress towards delivering on CO₂ reduction goals. Here are some examples:

- Seven new, more efficient, aircraft types have entered service, with another three due to enter the fleet before 2020.
- Airlines have spent over USD 1 trillion buying these more fuel-efficient aircraft and over 8,000 of them have entered the world's fleet.
- Over 100 airports have installed

solar power generation on-site and 156 are now part of the Airport Carbon Accreditation programme, representing over 32% of global passenger traffic.

- Improvements in air traffic management are helping to reduce emissions through measures such as performance-based navigation, air traffic flow management, shortening of routes and more flexible routings.
- We have tested, certified and flown over 2200 commercial flights on sustainable alternative fuels and anticipate having flown over 5500 such flights by the end of 2016. Lower-carbon fuels are now being used on regular flights from at least two international airports with more airports and routes to follow. If produced properly, they could reduce the industry carbon emissions by up to 80%.



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The industry is looking to governments to agree on the world's first global mandatory offsetting scheme for an industry sector at the upcoming International Civil Aviation Organization Assembly this autumn. It is unusual for an industry to ask governments for regulation but we believe that a balanced and effective global market-based measure (GMBM) that can be implemented from 2020 is required for the industry to be able to meet its second climate change goal.

At the 72nd IATA Annual General Meeting in Dublin in June this year, the airline industry overwhelmingly adopted a resolution on the development of a global market-based measure for international aviation, throwing its support behind the ICAO process and urging governments to progress discussions on the GMBM in a positive manner. We all have an opportunity to deliver a concrete and tangible regulatory solution that will contribute to addressing aviation's climate impact and it is an oppor-

tunity we cannot fail to seize.

We are confident the will exists across the sector to make history at the ICAO Assembly in October in Montreal.

What is the vision driving us all forward? It is a fundamental recognition that aviation connects families and businesses and brings people together safer and faster than ever before. We simply wish to continue doing that in an environmentally sustainable manner well into the future. ■

Paul Steele is Senior Vice President of Member and External Relations, and Corporate Secretary of the International Air Transport Association (IATA). He is responsible for guiding and implementing IATA's strategic advocacy and stakeholder relationship activities worldwide. Mr Steele served as the Executive Director of the Air Transport Action Group (ATAG) from 2008 to 2014. He currently serves as a member of the ATAG Board of Directors. Prior to joining IATA, Paul was Chief Operating Officer of WWF International. Before WWF, Paul had over 20 years' senior management experience with major international companies. His roles included Chief Executive of The Virgin Trading Company, Senior Vice President Sales, Marketing and Information Technology of the Hilton Hotel Group, and various senior roles at Pepsi Cola International, lastly serving as Group Vice President in charge of Northern Europe. Mr Steele holds a bachelor's degree in Business Administration with French and a diploma in Industrial Studies from Loughborough University. He is also a former faculty member of the Prince of Wales's Business and the Environment Programme run by Cambridge University.

Decarbonising transport

José Viegas

Secretary-General, International Transport Forum (ITF)



In May 2016, the International Transport Forum launched its Decarbonising Transport (DT) project at the Annual Summit of Transport Ministers in Germany together with more than 40 partners and supporting organisations. It aims at proposing a commonly acceptable pathway to achieve zero transport emissions by 2050, and offers a suite of modelling tools to navigate this pathway.

Aviation is responsible for around 2% of total global carbon dioxide emissions. Hardly a staggering figure, though environmentalists point out, correctly, that blowing CO₂ into the atmosphere at great heights does disproportionate harm to the fragile bubble that shields the earth from the potentially destructive power of the sun.

But demand for aviation is growing fast, as increasingly well-to-do citizens in middle-income countries discover the benefits of air travel. If nothing is done, aviation could quickly shoot up the league table of emitters and is likely to find itself even more in the spotlight.

The airline industry and the aviation sector as a whole have understood that climate change is an issue for them and they have taken big steps to begin to address it. First, the industry has set itself targets: it has vowed to cap emissions from 2020 and to halve net carbon emissions by 2050 based on 2005 levels.

Second, it is investing: serious money is going into better technology, increased operating efficiency and improvements in infrastructure that are geared to – among other things – meet those targets.

Third, the aviation industry is speaking out: it has brought together a well-co-ordinated coalition that is pressing national governments to take a common,

global approach to aviation emissions within the framework of the International Civil Aviation Organization (ICAO). Over 400 stakeholders from 65 countries work together in the Aviation Climate Solutions initiative, and the open letter to governments from 28 aviation leaders written in the run-up to the COP21 negotiations was widely noted.

All this demonstrates the industry's determination to be a responsible actor in the combat against climate change.



Yet we need to be quite clear about this: having international commitments in place, whether negotiated at sectoral or national level, is only the very beginning. It is one thing to set a target; the hard part is delivering on it. And even a cursory look at the commitments made by countries in the context of the COP21 Paris Agreement reveals that, though undoubtedly well-intentioned, they are as a rule not underpinned by clearly and coher-

ently described pathways that suggest robust plans to achieve the objectives exist.

Much of what is being put forward today in terms of decarbonisation measures in fact amounts to a huge wager on technological breakthroughs that will provide the silver bullet, or on wildly optimistic assumptions about the speed of penetration of existing but still marginal technologies. Aviation, too, is not free of this; the scenarios regarding the future role of biofuels for air transport – and the capacity to produce them at scale – come to mind.

Clearly, technology has a role to play in decarbonising transport. But we had better accept that that is not going to be enough, or at least not fast enough, and the stakes are too high to take a bet. Transport today accounts for about 23% of carbon emissions from fossil fuel combustion. While other sectors have succeeded in reversing the trend, transport's share continues to grow and by 2030 it could be a leading emitter with perhaps a 40% share.

There are two strategies to address this untenable situation: one is to have transport emissions fall as a result of forced limits on mobility. This would help save the planet but hit the transport sector hard, reduce opportunity for citizens and pull the rug from underneath economic development.



Transport Ministers pose in front of media for the 2016 Family Photo taking place at the International Transport Forum's 2016 Summit on "Green and Inclusive Transport" in Leipzig, Germany on 19 May 2016

The other is that transport succeeds in breaking the link between access, mobility and emissions. Overcoming its carbon dependency, still at over 90% more than 40 years after the first oil shock, is going to be difficult and very expensive. But the sector must realise that going green is the only way to guarantee growth in the long run, and its instinct should lead it to "come clean" as quickly and comprehensively as possible. Only then can transport continue to play its role as the backbone of the world economy and a creator of opportunity and prosperity.

In this context COP21 represents a watershed also for transport. True, the word transport isn't even mentioned in the text of the Paris Agreement. And true, international aviation and maritime transport were not included in the negotiations, so that it will be up to the member countries of ICAO and the International Maritime Organization (IMO) to act.

But COP21 has established a framework in which countries' commitments are subjected to five-yearly reviews of national decarbonisation commitments starting in 2020. These reviews should

become instrumental in monitoring progress and adjusting policies and measures to meet the commitments. And there is nothing to keep aviation, maritime transport or indeed any stakeholder in the climate change field from following this lead and creating synchronicity with countries.

The key challenge for the COP21 framework will be to make those policy reviews effective. Decision makers will need solid information and a holistic view of the impacts they are achieving (or not) and whether these are aligned with what happens elsewhere. Good intentions and a hunch will no longer do.

The Decarbonising Transport (DT) project launched by the International Transport Forum at the Annual Summit of Transport Ministers in Germany together with more than 40 partners and supporting organisations, has the ambition to provide the necessary tool to transport policy makers and business leaders. The DT modelling will allow to test and gauge the impact of individual actions in a highly complex and interdependent reality, to develop a realistic roadmap

towards decarbonisation, and then to navigate it with success.

There are three core elements on which the Decarbonising Transport project builds: first, data-driven quantitative analysis. Our ambition is to federate existing data and knowledge on transport to create the most comprehensive model of global transport activity to date. ITF has strong in-house modelling capabilities, and we are reaching out to potential partners with the aim of linking up existing models and leveraging their collective power to become more than the sum of the parts. This collective data crunching power will enable decision makers to calibrate their emissions reduction actions on the basis of the best simulations available.

Specifically for aviation, this work will build on the currently available passenger flows model developed by ITF in collaboration with multiple partners, mainly ICAO and Airbus.

Second, the Decarbonising Transport project is inclusive in nature. The modelling outputs will serve as the basis for a structured dialogue and mutual learning among a broad set of partners who



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From left to right: José Viegas, ITF Secretary-General - Hans Christian Schmidt, Minister for Transport and Building, Denmark - Norbert Barthle, Parliamentary State Secretary at the German Federal Ministry of Transport and Digital Infrastructure, during the International Transport Forum's 2016 Summit in Leipzig on 18 May.

are joining forces to design a workable roadmap towards carbon-neutral transport. Governments, corporations, universities, multilateral institutions, foundations and NGOs will all have their place and contribute knowledge, data or funding. Already, 22 major international companies are involved through the ITF's Corporate Partnership Board (in which the project is anchored).

Third, the Decarbonising Transport project's approach is non-prescriptive. It's not about telling others what to do, it's about helping them find and select how to achieve what they are aiming for. The reality is that no single best way to carbon-free mobility exists and that individual paths will differ, as will timelines. The DT project recognises this. The common assessment methodology it provides allows to align overarching objectives with individual, partial strategies.

DT is an open project and very

much a work in progress. All who have an interest in making our mobility, and therefore our way of life, sustainable are invited to become part of the effort. By May 2019, we want the modelling to be robust enough to provide effective support to the first round of reviews of the emissions reduction commitments made in Paris last December. I am confident we will see strong engagement from aviation as from the other modes in the Decarbonising Transport project. For too long now the different transport modes have been content to simply point out how relatively climate-friendly they are compared to others forms of transport. This kind of 'blame game' played from within outdated silos is not helpful and should be over. Transport as a whole needs to take responsibility, have a plan and speak with one voice. The Decarbonising Transport project offers a singular opportunity for this. ■



About ITF

- › The International Transport Forum at the OECD is an inter-governmental organisation with 57 member countries.
- › It is the only global body that covers all transport modes, acting as a think tank for transport policy.
- › It also organises an Annual Summit of transport ministers.
- › The ITF is administratively integrated with the OECD, yet politically autonomous.

José Viegas has been Secretary-General of the International Transport Forum (ITF) since August 2012. A Portuguese national, Mr Viegas has had a distinguished career in academia and in the private sector before joining the ITF, among other roles as a full Professor of Transport at the Technical University of Lisbon and chairman of TIS.pt consultants. Mr Viegas is a member of the UN Secretary General's High-level Advisory Group on Sustainable Transport.



International shipping and the move towards a low-carbon future

Stefan Micallef

Director of the Marine Environment Division, International Maritime Organization (IMO)

Mandatory energy-efficiency measures for international shipping apply across the global fleet. In this article, the International Maritime Organization's (IMO) Stefan Micallef outlines the major steps IMO has already taken towards mitigating climate change, and highlights capacity-building projects to support transfer of technology.

Growth of globalisation has fuelled rapid growth in international trade, most of which is propelled around the world by the fossil fuel-powered workhorse engines in ships, trains, aeroplanes and trucks. Aviation and shipping contribute directly to economic growth, helping to create millions of jobs at home and abroad through increased trade and tourism.

Though this growth has brought many positive changes – improved standards of living, greater access to goods and services, and increased prosperity – it has also brought with it increased impacts on human health and the environment.

The Paris Agreement on Climate Change was a major achievement for the international community. When UN Secretary General Ban Ki-moon visited IMO earlier this year, he described it, along with the adoption of the Sustainable Development Goals, as a victory for the world's people and a triumph for multilateralism.

Everyone must play a part in this effort – no industry or sector can be excluded, and that applies to shipping too. International maritime transport is the most energy-efficient mode of mass cargo transport. As the industry that physically delivers around 90% of global trade and is a key servant to the world's economic engine, it is incumbent on shipping to make its own contribution.

While the Paris Agreement makes no specific mention of shipping, IMO, as the global regulator of the shipping industry, is where the governments of the world come together to develop the regulatory framework for international shipping.

For decades, the member nations of IMO have exercised strong and decisive leadership in creating the legal and technical framework within which shipping has become progressively cleaner and safer – while continuing to provide the world with a cost-effective way to transport the goods and commodities that underpin the world's economy and sustain global society.

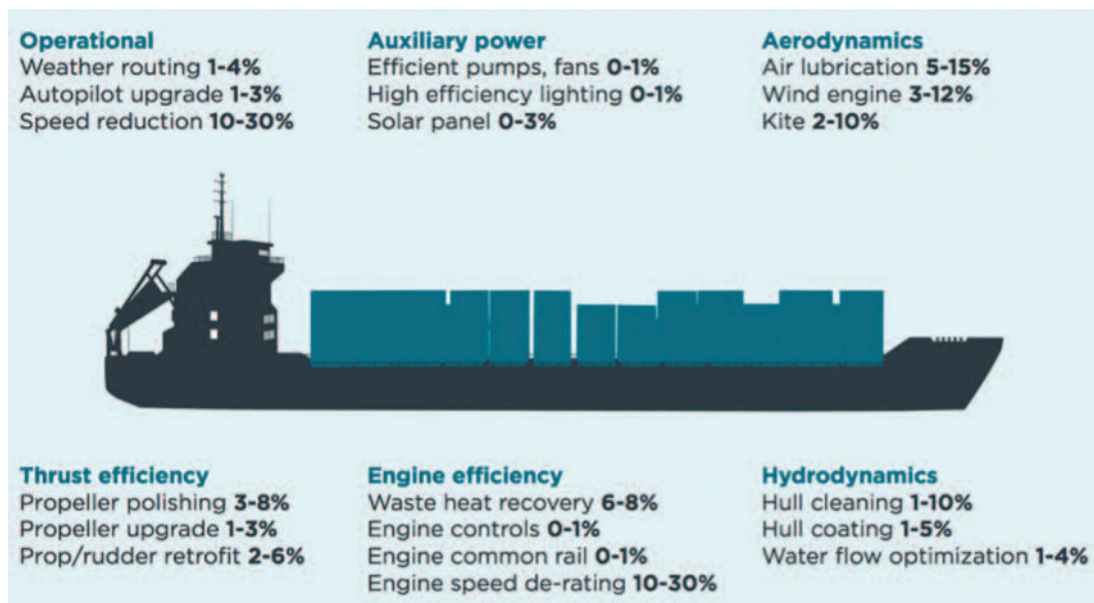
Indeed, IMO's own long-standing and well-established independent mandate to pursue greenhouse gas (GHG) emission regulation

from international shipping can be traced back to the International Convention for the Prevention of Pollution from Ships (MARPOL) Conference held in September 1997, which adopted a new Annex VI to MARPOL on regulations for the prevention of air pollution from ships, and also adopted a resolution on CO₂ emissions from ships.

Later that year, the third Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Kyoto Protocol, which handed responsibility to limit and reduce international aviation and shipping emissions to the UN specialised agencies responsible for regulating these sectors – the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) respectively.



Ships fuelled with LNG can reduce CO₂ emissions by some 20%



Source: International Council on Clean Transportation (ICCT), Long-term potential for increasing shipping efficiency through the adoption of industry-leading practices, Wang & Lutsey, 2013

A great deal of progress has already been made. To date, IMO is the only organisation to have adopted energy-efficiency measures that are legally binding across an entire global industry and apply to all countries. The mandatory Energy Efficiency Design Index (EEDI) and the Ship Energy Efficiency Management Plan (SEEMP) entered into force under the existing MARPOL Annex VI in 2013. By 2025, all new ships will be at least 30% more energy efficient than those built in 2014. This is more than a target, it is a legal requirement.

The EEDI requirement aims to increase the energy efficiency of new ships over time. It is a non-prescriptive mechanism that leaves the choice of which technologies to use in a ship design to the stakeholders, as long as the required energy-efficiency level is attained, enabling the most cost-efficient solutions to be used. It is therefore intended to stimulate innovation in, and continued development of, the technical elements influencing the energy efficiency of a ship.

Reduction factors are set until 2025 when an improvement in energy efficiency of up to 30% over the average energy efficiency for ships built between 1999 and 2009 will be required. The EEDI has been developed for the largest and most energy-intensive segments of the world merchant fleet and, with the

recent inclusion of additional ship types, will embrace approximately 85% of emissions from international shipping.

The regulations also make mandatory the Ship Energy Efficiency Management Plan (SEEMP) for all ships over 400 gross tonnage. The SEEMP is an operational measure that establishes a mechanism to improve the energy efficiency of a ship against business-as-usual, in a cost-effective manner, and also provides an approach for monitoring ship and fleet efficiency performance over time, using, for example, the Energy Efficiency Operational Indicator (EEOI) as a monitoring and/or benchmarking tool.

Some examples of technology innovations expected to be adopted through effective EEDI and SEEMP implementation include engine efficiency improvements, speed reduction, weather routing, use of alternative energy sources for auxiliary power and a focus on aerodynamics. Speed reduction presents one of the largest opportunities for reductions in fuel consumption and CO₂ emissions, because it significantly reduces hydrodynamic and aerodynamic loads on the ship. However, slower ships means either more ships or larger ships are required for shipping to do the same 'transport work'. Optimisation of maintenance and operational

practices, such as regular propeller and hull cleaning, can also reduce power requirements.

It is expected that the uptake of SEEMP measures should have a significant effect in the short to medium term, while EEDI measures should have a greater impact in the longer term as fleet renewal takes place and new technologies are adopted.

These efforts are working. To date, more than 1700 new ships have been certified as complying with the new standards. Through compliance with IMO regulations, shipping can grow with the global economy while continuing to take a genuine leadership role in mitigating its contribution to climate change.

The Third IMO GHG Study, published in 2014, estimated that during the five years to 2012 the total contribution from international shipping to global CO₂ emissions actually reduced from 2.8% to 2.2%. This was despite significant overall growth in seaborne trade and a corresponding growth in cargo-carrying capacity during the same period.

Had no regulatory measures been developed, CO₂ emissions had been projected to grow between 200% and 300% by 2050, despite significant market-driven efficiency improvements. The study identified a number of sce-



Larger container ships – increases energy efficiency through increased transport work for same or less energy consumed

narios for projected emissions from ships, based on different 'business as usual' (BAU) scenarios and forecasted a growth in CO₂ emissions for international maritime transport of 50% to 250% in the period up to 2050, in the absence of further regulations.

While the mandatory energy-efficiency measures have been adopted, those operational and technical measures alone may not be enough to stem emissions adequately. So we do need to look at further measures if those BAU scenarios are not considered acceptable. We also need to focus on establishing a culture of "low-carbon" shipping so that operational energy-efficiency measures can be fully implemented.

More recently, governments at the IMO's Marine Environment Protection Committee (MEPC) approved mandatory requirements

for ships to record and report their fuel consumption.

In simple terms, the system will require ships of 5000 gross tonnage and above to collect consumption data for each type of fuel they use. The aggregated data will be reported to IMO by the flag State after the end of each calendar year and IMO would be required to produce an annual report to the MEPC, summarising the data collected. Data would be anonymised so individual ship data would not be recognised.

The proposed IMO Ship Fuel Consumption Database is the first in a three-step approach in which analysis of the data collected would provide the basis for an objective, transparent and inclusive policy debate at IMO. This would allow a decision to be made on whether any further measures are needed to enhance energy effi-

ciency of ships and whether identified further measures would effectively and sufficiently address greenhouse gas emissions from international shipping. If so, proposed policy options would then be considered.

The draft mandatory data collection requirements will be put forward for formal adoption at the next MEPC session in October this year, and could enter into force as early as 2018.

IMO will always work on the basis that international shipping needs global regulation. This is set out in the Convention establishing IMO, which makes clear the purpose of the Organization is "to encourage the removal of discriminatory action and unnecessary restrictions by governments affecting shipping engaged in international trade so as to promote the availability of shipping services to the commerce of the world without discrimination".

It is important that we work with Member States and industry towards instilling a culture that looks towards best practice in achieving lower ship emissions. IMO's technical cooperation programme exists to provide co-ordinated technical assistance to States, and there is much that can be done by governments, industry and other stakeholders to support an energy-efficiency culture and to overcome the barriers to achieving optimum reductions in GHG emissions. IMO is vigorously supporting capacity building, in particular through two projects to support the uptake and implementation of energy efficiency measures.

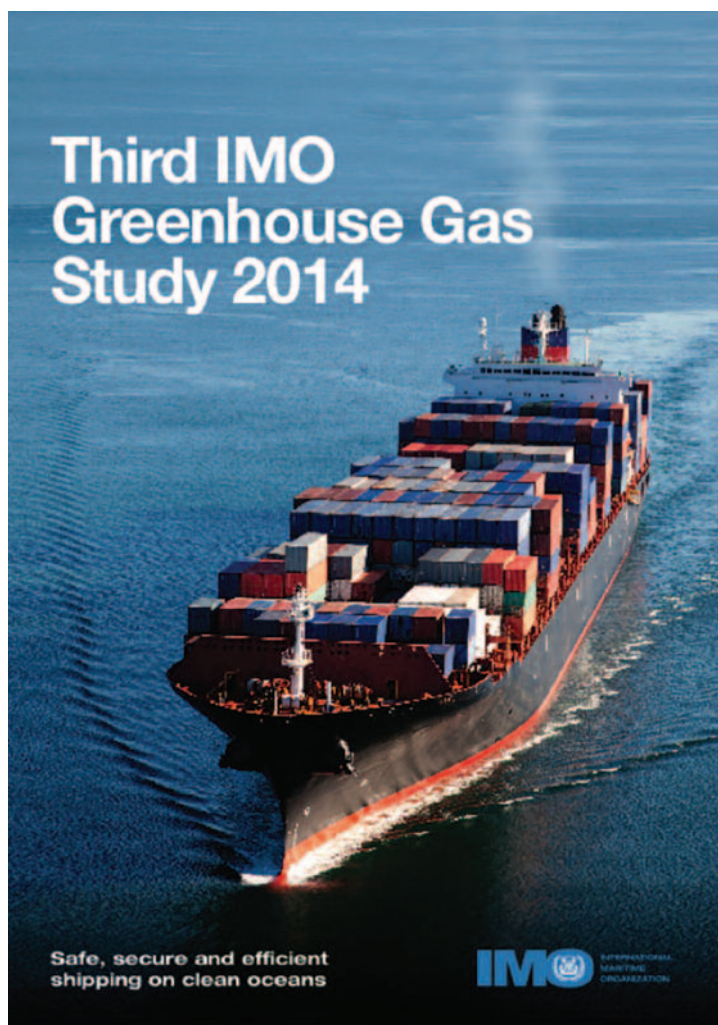


MV Harvest Frost - ship with bubble technology to improve energy efficiency – see illustration p. 31

The first is the exciting GloMEEP project, formally designated “Transforming the Global Maritime Transport Industry towards a Low Carbon Future through Improved Energy Efficiency”. IMO is executing this innovative Global Environment Facility (GEF)-funded GloMEEP project in partnership with the United Nations Development Programme (UNDP), and delivering the project through ten lead pilot countries. A number of national workshops have been held or are planned in the lead pilot countries, while a global train-the-trainer workshop on energy efficiency was recently delivered in China preparing the personnel needed to cascade knowledge on energy efficiency for ships and related efforts for mitigation of greenhouse gas emissions from international shipping.

The second major project is an innovative four year €10 million EU-funded programme that will see IMO establish a global network of maritime technology cooperation centres (MTCCs) in developing countries to help limit and reduce GHG emissions from their shipping sectors. IMO has received 43 expressions of interest from around the world to host the MTCCs and is working with the European Union to draw up a final shortlist so that the chosen five MTCCs can begin specific projects in 2017.

There is no doubt the Paris Agreement has placed increased scrutiny on IMO’s work to address greenhouse gas emissions from shipping and thereby contribute to the global imperative to tackle climate change. IMO is playing a major role in ensuring that the spirit of the agreement is translated into tangible and lasting improvements in shipping, an industry which is indispensable to world trade. ■



Third IMO GHG Study 2014 – provides most recent estimate for CO₂ emissions from international shipping in 2012 and forecasts CO₂ emissions to 2050



Illustration shows the air bubbles produced by the Mitsubishi Air Lubrication System (MALS) system. Illustration credit: MHI

Stefan Micallef started his career with the United Nations in 1990 as a Programme Officer at the UNEP/IMO - Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) based in Malta. In 2000, he joined UNEP’s Division of Environmental Policy Implementation in Nairobi as Chief of the Disaster Management Branch where he was responsible for policy and strategy formulation. In 2004, Dr Micallef moved to IMO’s headquarters as Head of the Chemical & Air Pollution Prevention Section, Sub-Division for Pollution Prevention, Marine Environment Division. In 2007, he was appointed Deputy Director of the Sub-Division for Pollution Response and Technical Cooperation Co-ordination and was later appointed Director of the Marine Environment Division in January 2012. Dr Micallef graduated with a PhD in marine toxicology from the University of Wales, United Kingdom.



European aerospace manufacturers – reducing aviation’s environmental impact responsibly

Naresh Kumar

Chairman of the Environment Commission, AeroSpace and Defence Industries Association of Europe (ASD)

Aviation is recognised as one of the top five advanced technology sectors in Europe. ASD Industries achieved a turnover of almost €200 billion in 2014 employing a skilled workforce of nearly 800 000, of which over half a million were in aeronautics. ASD members collectively spent €20 billion on research and development in the year. This supports innovation to enable aviation in its key role to satisfy society’s needs for safe, secure and sustainable mobility in Europe and all over the world.

▶ Strong track record

The aviation industry has an excellent track record of reducing fuel burn, and hence CO₂ emissions. Since the start of the jet age over 60 years ago, the industry has reduced fuel burn by around 70%. Aircraft entering today’s fleets are typically 20 decibels per operation quieter than comparable aircraft 40 years ago, which represents 75% less annoyance. New generation of low NO_x technology has been introduced to meet three successive increases in ICAO stringency standards, and carbon monoxide, hydrocarbons and smoke have been significantly reduced.

CO₂ reduction has been managed effectively through industry investment in technology and as a result of competitive market forces to deliver a strong record of fuel efficiency improvements. Other emissions have been reduced as a response to the needs of society and to mitigate climate and other environmental impacts.

ASD is a key stakeholder within ACARE (Advisory Council for Aviation Research and Innovation in Europe), which has set very challenging environmental goals for 2050 relating to civil aero products, for technologies and procedures to enable:

- 75% reduction in CO₂ per passenger kilometre

- 90% reduction in NO_x emissions, and
- 65% reduction in perceived noise of flying aircraft (all relative to the capabilities of typical new aircraft in 2000).

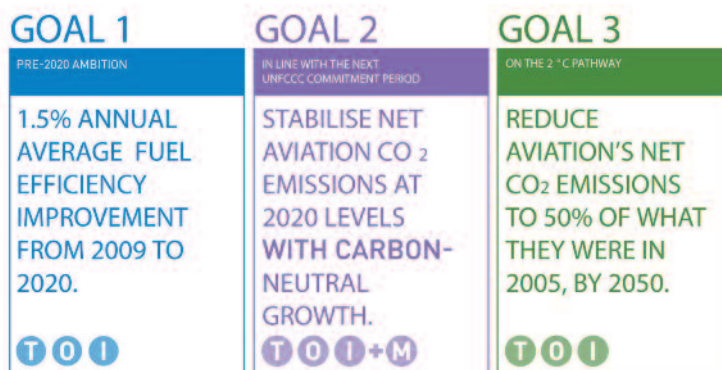
▶ Global action on CO₂ emissions reduction

At the 37th Session of the International Civil Aviation Organization (ICAO) Assembly in 2010, Member States adopted aspirational goals for the global air transport sector to improve fuel efficiency by 2% per annum and to limit CO₂ emissions at 2020 levels. The Assembly also defined a basket of measures designed to help achieve these goals including:

technology standards, operational measures, alternative fuels, and market-based measures (MBM).

ICAO has since developed a global CO₂ emissions standard for aircraft based on the work of the Committee on Aviation Environment Protection (CAEP). The ICAO Council is expected to approve this standard at its 39th Assembly in September/October 2016 along with a standard on non-volatile particulate matter (nvPM) emissions. Thereafter, national governments or the European Aviation Safety Agency (EASA) in Europe will need to implement these global standards into legislation and/or regulation.

ASD considers the proposed global CO₂ standard to be technically feasible and ambitious to meet the challenging environmental goals that are set. The develop-



Aviation industry commitment to carbon-neutral growth 2020 (presented at the 38th ICAO General Assembly September 2013 position paper – ACI, CANSO, IATA, IBAC & ICCTA)



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ment of this standard was one of the recommended elements within the United Nation’s ICAO Programme of Action on International Aviation and Climate Change.

The standard will incentivise manufacturers of all newly developed aircraft and engines as well as those in production to incorporate latest commercially available proven technologies into the product line. This will ensure that improvements, from “technology” advancement and innovation, to reducing aviation’s carbon footprint, are maintained in the future.

The 38th ICAO Assembly in October 2013 concluded with the adoption of a landmark decision by Member States to develop a global MBM to be effective from 2020 and to complement the important action taking place in technology, operations and infrastructure efficiency improvements.

Agreement on a global MBM is an essential pillar from the basket of measures to meet global CO₂ emissions reduction objectives. This is also a key agreement to be sought by the ICAO Assembly in September/October 2016.

The global air transport sector is fully supportive of the ICAO process and has committed to meeting very challenging environmental goals. As a member of the International Coordinating Council

of Aerospace Industries Associations (ICCAIA), ASD is actively engaged in improving the environmental performance of products and services provided by its members as well as of their own operations.

The global aviation industry via the Air Transport Action Group (ATAG) is tackling climate change through a four-pillar strategy addressing technology, infrastructure, operations and a global market-based measure. The goal is to achieve a 1.5% average annual fuel efficiency improvement from 2009 to 2020, to stabilise net CO₂ emissions at 2020 levels through carbon-neutral growth, and by 2050 to reduce aviation’s net CO₂ emissions to 50% of what they were in 2005.

► Technology readiness to meet stringent regulatory requirements

Aviation is a long-life cycle sector where aircraft can remain in service for over 25 years and aircraft production cycles can typically run for around 40 years. Although safety and reliability are of paramount importance, product designs must also address operability and maintainability issues,

market requirements such as payload-range, take-off and landing field length capabilities, emissions and other environmental considerations such as noise, as well as additional requirements including recyclability potential. Optimising these numerous requirements is complex and requires a huge effort in engineering excellence.

The design of any regulatory requirements should take this into account to avoid any unintended consequences regarding long-term economic considerations and potential competitive distortions, as well as trade-offs with other environmental and safety requirements.

The aviation sector continues to search for more environmentally friendly alternative technologies. One such technology is alternative fuels including bio-derived fuels that offer potential to further reduce CO₂ emissions from aviation. Some alternative synthetic fuels are already approved and are direct physical replacements for conventional kerosene, so-called ‘drop-in’ fuels. The air transport sector recognises that the fuel must meet three key criteria – suitability, scalability and sustainability. Feedstocks from waste streams are of particular interest where there is no risk of competition with food production.



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At the same time, industry is working hard to take care of future risks such as identifying alternative chemicals and materials that fall within the REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) regulation. ASD continues to work in close cooperation with its supply chains and trade association and European policy makers on this important issue to manage risks and ensure compliance with legislation without compromising safety and component life.

► Summary remarks

Industry will continue to innovate through investment in research and technology with support from policy makers, to develop efficient and low-emissions products for the future. This will enable the European aerospace manufacturers to continue to reduce the environmental emissions of products and services as well as make further strides towards lessening the environmental impact of their operations.

ASD strongly supports ICAO as the fundamental global forum for agreement on international aviation environmental measures, offering a consistent framework and promoting effective action. ■



About ASD

- ASD represents the aeronautics, space, security and defence industries in Europe.
- Based in Brussels, the organisation’s membership today comprises 14 major European aerospace and defence companies and 26 member associations in 19 countries (Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey and the UK).
- These industries reach a turnover of 197.3 billion euro, invest 20 billion euro in R&D, employ close to 778 000 people and counts over 3000 companies, 80 000 suppliers, many of which are SMEs.

Naresh Kumar has worked in the aerospace sector for over 30 years after obtaining a degree in aeronautical engineering from Imperial College, London. He gained a PhD in manufacturing during his initial experience within Rolls-Royce and is a Fellow of the Royal Aeronautical Society. During his career he has held various positions in Rolls-Royce including in energy, manufacturing, procurement, quality and defence as well as aerospace. He also ran the company’s office in Brussels, Belgium, as the Director of EU Relations for three years. In his current role in Rolls-Royce as Chief of Environmental Technology within the Engineering and Technology Group, Dr Kumar is responsible for developing the company’s response to the environmental challenge posed by climate change and other emissions, including noise. In addition to holding the Chair of the Environment Commission for ASD, which represents the civil aviation, space, security and defence industries in Europe, he also chairs the ACARE (Advisory Council for Aviation Research and Innovation in Europe) Communications Group.

Airport Carbon Accreditation – encouraging airports to increase their sustainability



Marina Bylinsky

*Manager Environmental Strategy & Intermodality,
ACI EUROPE (Airports Council International)*

Addressing climate change triggers some innovative carbon management solutions. Marina Bylinsky presents the *Airport Carbon Accreditation*, a global carbon management standard for airports, which assesses and recognises airports' efforts to manage and reduce their carbon emissions since June 2009.

The urgency to curb climate change has gained new, vivid public attention over the last year. The world's leaders came together to agree on a new global climate treaty at the 21st Conference of the Parties (COP21) to the United Nations Framework Convention for Climate Change (UNFCCC) in December 2015, and successfully tackled this challenge.

The resulting Paris Agreement lays the foundation for an increasingly ambitious and truly global climate action, encompassing 195 countries. At the same time, ICAO has been actively progressing in addressing emissions from international aviation, through the recommendation for the adoption of a CO₂ standard for aircraft and the negotiations on a global market-based measure allowing the aviation industry to reach carbon-neutral growth as of 2020.

In this context, the airport sector plays a key role, as it is situated at the interface between aviation and other sectors, such as buildings or energy. Consequently, emissions at airports cover both the international aviation emissions – in the scope of ICAO – and the domestic (aviation and non-aviation related) emissions – tackled by the Paris Agreement. Addressing all of these emissions on an airport site is a challenge that requires a lot of creativity and tenacity from the airport operator. But it can also give

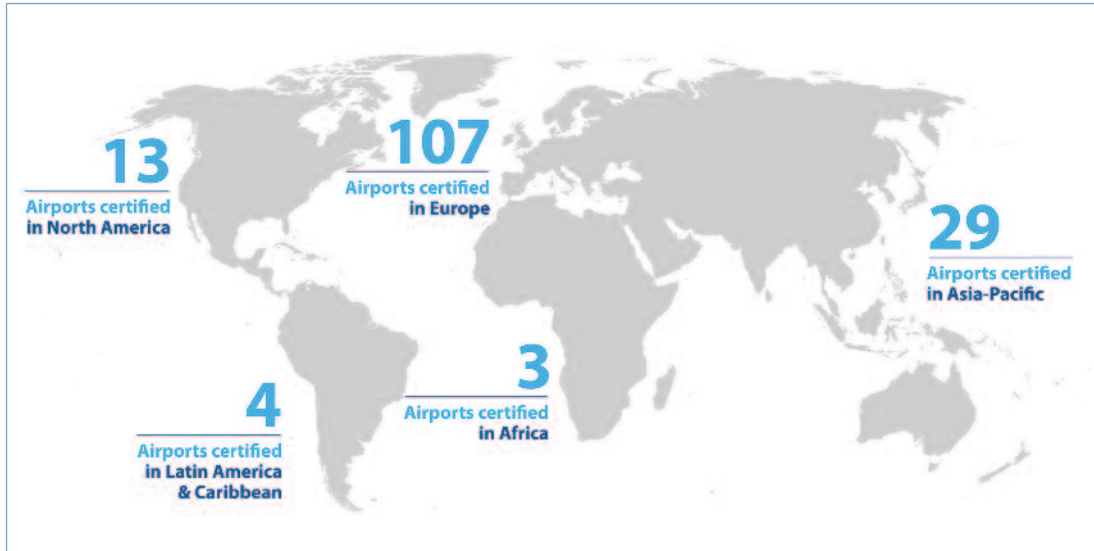
rise to highly innovative carbon management solutions. Encouraging and recognising these solutions is the purpose of *Airport Carbon Accreditation*, the only independent, global carbon management standard for airports.

The launch of this programme followed a resolution by Airports Council International (ACI) EUROPE, the trade association representing European airport operators, issued in 2008. In it, European airports committed to reduce their impact on climate, with the ultimate goal of becoming carbon neutral. To support the implementation of this objective, the resolution also called on ACI EUROPE to establish a dedicated technical framework in 2009 - which became *Airport Carbon Accreditation*.

Airport Carbon Accreditation assesses and recognises the efforts of airports to manage and reduce their carbon emissions according to four ascending levels of certification: 'Mapping', 'Reduction', 'Optimisation' and 'Neutrality'. Throughout these levels, airports have to comply with increasing obligations, in particular by including emissions from third party stakeholders operating at the airport in their carbon management - notably airlines, ground handlers or retailers. The ultimate certification level - carbon neutrality - requires that the airport offsets those remaining CO₂ emissions under its direct control that cannot be further reduced.



At the signing of a special partnership between Airports Council International & the UNFCCC during COP21



ACI's independently run carbon management programme for airports is available to airports worldwide

Over the last seven years, the programme has achieved amazing growth. While in the first programme year (June 2009 to May 2010) only 17 European airports were accredited, the programme has since then gradually expanded to all world regions, with 156 airports currently certified today. These airports represent 31% of worldwide air passenger traffic. One hundred and seven of them are located in Europe and represent 64% of European passenger traffic, with 22 being recognised as carbon neutral. The actions taken by airports to achieve accreditation are very diverse and include efficiency improvements of lighting and heating systems in terminal buildings, the procurement or direct generation of electricity from renewable sources, and the use of low-carbon fuel for ground services.

To explain the success of the programme, three of its fundamental strengths can be highlighted. Firstly, it has a robust technical foundation, which applies to various industry sectors - the Greenhouse Gas Protocol, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) and ISO14064. These cross-sectoral standards have then been adapted to the specificities of airports, which facilitates their understanding and uptake by the industry. Secondly, the programme takes full account of the interface nature of

the airport business, by making stakeholder engagement a condition for certification at the highest levels of the programme. Last but not least, while *Airport Carbon Accreditation* has been designed specifically for airports and by airports, the day-to-day administration of the programme, including the decisions on certifications, is performed by an independent third party: the leading environmental consultancy WSP | Parsons Brinckerhoff, which has been supporting the programme since its inception. Furthermore, each annual airport application must be independently verified before it is submitted to the administrator. All applications are thus subject to a double quality control. Finally, the programme is supervised by an independent advisory board, comprised of representatives of highly authoritative institutions in the area of aviation and environment, such as ECAC, ICAO, the European Commission, EUROCONTROL, the US Federal Aviation Administration (FAA), the Manchester Metropolitan University (MMU) and, since COP21, the United Framework Convention for Climate Change (UNFCCC).

The UNFCCC is very supportive of *Airport Carbon Accreditation* as evidenced by the conclusion of a Memorandum of Understanding (MOU) with ACI at COP21. Through this agreement, it commits to promoting *Airport Carbon Accreditation*, while ACI is supporting the

initiative *Climate Neutral Now*, launched by the UNFCCC in order to encourage climate action by the civil society and business, which is gaining increased importance in the wake of the Paris Agreement. On the occasion of the MOU signature, Christiana Figueres, Executive Secretary of the UNFCCC, said "What ACI has achieved through *Airport Carbon Accreditation* over the past six years is inspiring – to mobilise so many airports in the journey towards carbon neutrality is an example that many other industries could learn from. We count on their support for our *Climate Neutral Now* campaign and look forward to working with them through our new partnership."

In addition, *Airport Carbon Accreditation* has also received additional recognition through its inclusion in the first European Aviation Environmental Report 2016, produced by the European Aviation Safety Agency (EASA), the European Environment Agency (EEA) and EUROCONTROL. The authors of the report have analysed the quantitative results of the programme and concluded on steadily decreasing carbon emissions per passenger at accredited airports in Europe. The inclusion of *Airport Carbon Accreditation* into the ECAC State Action Plans as a potential source of co-benefits in terms of domestic emission reductions is also a valuable recognition of the programme and the airports' climate action.



Asian airports in the programme, marking 5 years of its presence in the Asia-Pacific region of ACI

Nevertheless, the airport industry is not intending to rest on its laurels. To remain certified under *Airport Carbon Accreditation*, airports must regularly renew their applications and consequently have to continue identifying new climate mitigation solutions, and show an increased ambition. In alignment with the latter, at COP21 ACI EUROPE committed to reach 50 carbon-neutral airports in Europe by 2030. Elsewhere, airports in other regions are also about to achieve this status for the first time. Against the background of the Paris Agreement and the upcoming ICAO global market-

based measure, *Airport Carbon Accreditation* demonstrates that the airport industry is assuming its part of responsibility in mitigating climate change, and also engaging other stakeholders in this action. Its reach goes beyond airport operators and provides an impetus for a collaborative effort by all aviation stakeholders to reduce their environmental footprint and achieve the goals set out by the industry. ■

For all the latest information, visit www.airportCO2.org and follow @AirportCO2 on Twitter.

Marina Bylinsky joined ACI EUROPE in September 2015 and is responsible for the co-ordination of all aspects of the association's environmental strategy. In this regard, she represents ACI EUROPE in various high-level EU, ECAC and EUROCONTROL fora. She also monitors the administration and ongoing evolution of the global carbon standard, Airport Carbon Accreditation, which belongs to ACI EUROPE. Prior to joining ACI EUROPE, Marina worked as a Senior Consultant at BearingPoint in France and in Belgium. During this time, she worked on several projects with the European Commission, the SESAR Joint Undertaking and EASA. Ms Bylinsky is a graduate of the Institute of Political Sciences in Paris where she graduated with a Masters in Comparative Politics, following a BA in Political Science. A German national with Ukrainian origins, she also speaks fluent English, French and Russian.



An international deal to tackle climate change

Tim Johnson

Director, Aviation Environment Federation (AEF)

Tim Johnson explains how environmental NGOs would be supportive of a deal giving each airline the flexibility to reduce emissions from its own operations and to purchase emissions units from other carbon market programmes, as long as it includes the key elements to ensure the environmental integrity of the measure.

In December 2015, the UN climate change conference concluded with the Paris Agreement, a treaty that marks the next phase in international collaboration to tackle climate change, recognising the need for, and committing to, collective action to limit global warming to below 2°C. But getting below 2°C, and pursuing efforts to limit that increase to 1.5°C, will mean delivering on the commitment to reduce emissions to net zero before the end of the century.

The Agreement's objectives cover all anthropogenic emissions including those from international transport, although it does not specify how international transport emissions are to be addressed (unlike domestic aviation emissions, they fall outside of the pledges by States, known as nationally determined contributions, NDCs). The challenge is that while we chart pathways towards a net zero carbon future, aviation emissions in particular are forecast to increase significantly. The trends assessment published in the recent environment report ⁽¹⁾ from the UN agency, the International Civil Aviation Organization (ICAO), highlight that between 2005 and 2050, CO₂ emissions from international aviation will more than quadruple without action to encourage better efficiency and sustainable alternative fuels.

ICAO has been the forum for States to negotiate a solution to these soaring emissions. In 2010, the Organisation's 191 Member States agreed a goal to deliver a fleet-wide efficiency improvement of 1.5% per annum, while capping net aviation emissions from international levels at 2020 levels. Measured against this 2020 baseline, in-sector reductions alone will be insufficient to deliver this goal. Based on the most optimistic scenario for improvements in fuel consumption, by 2050 CO₂ emissions are expected to exceed the 2020 level by 1,039 Mt per annum. With more likely technology projections, aviation's cumulative "emissions gap" over the period 2020 to 2050 that will need to be addressed if the 2020 goal is to be met, is a huge 7.8 billion tonnes.

Both ICAO and the industry are promoting alternative fuels as one of the measures to reduce this gap, but the same ICAO environment report highlights the sheer scale of investment required. To maintain emissions at or below 2020 levels out to 2050 would require a near "complete replacement of petroleum-based jet fuel with sustainable alternative jet fuel besides the implementation of aggressive technological and operational scenarios." To support this the report estimates that approximately 170 new large biorefineries would need

to be built every year from 2020 to 2050, at an approximate capital cost of US\$ 15 billion to US\$ 60 billion per year if growth occurred linearly. It would also require the highest possible levels of agricultural productivity, availability of land for feedstock cultivation, residue removal rates, conversion efficiency improvements, and reductions in the GHG emissions of utilities.

While sustainable alternative fuels that also promote sustainable development benefits are encouraged, realistically the supply of alternative fuels to the aviation sector over the next couple of decades is likely to be limited. So how can the industry meet the goal to stabilise net emissions at 2020 levels? The answer is a market-based measure (MBM). ICAO has been looking at how MBMs could tackle emissions from international aviation since 1998, focusing on the role for taxation, charges and emissions trading schemes. The current proposal, initiated at the 2010 Assembly and due to be discussed at the Assembly this autumn, favours an offsetting scheme. Given the limited contribution of the other measures, an MBM is now a necessity rather than an option, and agreeing an effective scheme will require States to demonstrate that the spirit of Paris is reflected in the outcome of the Assembly.

(1) Environment Report 2016, ICAO www.icao.int/environmental-protection/Pages/ENV2016.aspx

Environmental NGOs are supportive of a deal that would give each airline the flexibility to reduce emissions from its own operations and to purchase emissions units from other carbon market programmes, but have stressed that it must include key elements that will ensure the measure has environmental integrity. A campaign, FlightPath 1.5⁽²⁾, has been launched to track progress in the negotiations and highlight the key issues and tests that will define the robustness of the MBM. As well as capping and cutting emissions from the entire international aviation sector, leading environmental NGOs have advocated an aggressive and transparent ICAO deal that meets three key criteria:

- Wide coverage of emissions to attain the goal
- Regular reviews to review the stringency of the cap, and
- The use of high-quality emission reductions and low-carbon bio-fuels that promote sustainable development.

To minimize distortions and deliver the goal, ICAO needs to maximize the number of States participating in the MBM. Of course there is a legitimate case for some States to be exempted because of size, dependency or for reasons of economic development but, if the goal is to be attained, environmental effectiveness has to carry as much weight as political compromise. The goal has to be seen as mandatory rather than aspirational and at least 90% of total emissions should be covered.

Perhaps the most pressing issue is to align the aviation sector with the ambition of the Paris Agreement. Setting the cap to stabilise net emissions at 2020 levels is recog-

nised as an initial step but more aggressive action will be required out to 2050. The extent to which the cap needs to be tightened should be informed by setting a long-term 2050 target, with interim milestones, and based on scientific evidence. This requires an understanding of how projected aviation emissions fit with the overall carbon reduction pathway necessary to keep global warming below 1.5°C, a work item that ICAO's technical environment committee has identified already.

To ensure that the MBM is consistent with this long-term target and aligned with the Paris temperature goals, it should allow for regular reviews. The Assembly resolution should commit ICAO to such reviews to set a path for industry to ratchet its emissions down in line with making a fair contribution to the overall emission reduction required.

As the above questions relate to the effectiveness of the design of the MBM, it is also important to look at what airlines are being asked to do, both in terms of the monitoring, reporting and verification requirements (MRV), and the emissions unit reductions that they will be allowed to use. The technical work to establish MRV protocols is advanced and many parties already have the shared objective of developing simple, accurate flight-by-flight MRV requirements with reasonable safeguards for commercial confidentiality. All of this should support clear compliance requirements that are enforceable under existing regulatory authorities.

It is envisaged that the credits eligible for offsetting under the MBM will come from either offset pro-

grammes or allowance units from emissions trading schemes. These will almost exclusively be sourced from other sectors (although some Clean Development Mechanism (CDM) methodologies now exist to approve credits from airport operations), but will need to demonstrate their environmental integrity. As with MRV, ICAO has made good progress in developing criteria for assessing whether offsets deliver emission reductions that are real, additional, verifiable and permanent. Not all offsets offer the same environmental and social benefits and the environmental NGOs participating in ICAO's work would like to see a clear statement that questionable types, such as those based on HFC-23, adipic acid, carbon capture and storage, large hydro, nuclear and fossil fuel projects, are clearly excluded upfront.

The Paris Agreement was possible because of the momentum generated by States to take an ambitious approach to tackling climate change. Ten months on, the ICAO Assembly is the first major test of whether that momentum and ambition continue. Although previous Assemblies have failed to reach consensus on what has often been a politically contentious debate on MBMs, the progress made in the last few years, coupled with industry and environmental NGO support, have raised hopes for a successful outcome this time around. But the criteria to measure its effectiveness require a strong commitment to delivering a scheme that stands up to scrutiny from an environmental perspective. ■

(2) Flightpath 1.5
<http://www.flightpath1point5.org>

Tim Johnson is the Director of the Aviation Environment Federation (AEF) and has over 25 years' expertise in the aviation and environmental field. He is a member of the UK Department for Transport's External Advisory Group, Sustainable Aviation's Advisory Panel and ACI's Airport Carbon Accreditation Advisory Board. He represents the environmental NGOs at the International Civil Aviation Organization (ICAO) where he chairs groups set up by the Committee on Aviation Environmental Protection (CAEP) to oversee ICAO's carbon calculator and the development of "offset eligibility criteria" for potential use in a global market-based measure. In 2014, Mr Johnson received the Royal Aeronautical Society's Specialist Award for "the significant, authoritative and responsible contribution made to moving the debate on the environmental effects of aviation forward".

▶ Member States News

New Directors General were appointed in:

- > *Poland* – Mr Piotr Samson
- > *Ukraine* – Mr Oleksander Bilchuk

▶ Composition of the Co-ordinating Committee (September 2016)

- > **Ingrid Cherfils** – DGCA Sweden – President
Focal Point for External Relations
- > **Patrick Gandil** – DGCA France – Vice-President
Focal Point for Environmental matters
- > **Bilal Ekşi** – DGCA Turkey – Vice-President
Focal Point for Pan-European matters
- > **Silvia Gehrler** – DGCA Austria
Focal Point for Economic matters
- > **Pekka Henttu** – DGCA Finland
Focal Point for Safety
- > **Gerold Reichle** – DGCA Germany
- > **Alessio Quaranta** – DGCA Italy
Focal Point for Facilitation and Security
- > **Rob Huyser** – DGCA Netherlands
- > **Mario Nemeth** – DGCA Slovakia
- > **Raül Medina Caballero** – DGCA Spain
Focal Point for RPAS
- > **Dan Micklethwaite** – DGCA United Kingdom

▶ Assistance to victims of air accidents and their families is focus of ECAC workshop in Malaga

Over 60 delegates gathered in Malaga on 9 and 10 June at the kind invitation of the Spanish Ministry of Development to attend an ECAC workshop on assistance to victims of air accidents and their families.

Carmen Librero, Spanish Secretary General for Transport, launched the event with a keynote address. She emphasised Spain's ongoing commitment to pursue its active efforts in this area, not only for the continuous improvement of its domestic framework but also to lead initiatives at the international level. Moderated by the chair of ECAC's Facilitation Working Group, Frédéric Rocheray (Federal Office of Civil Aviation, Switzerland), the event assembled representatives from several ECAC Member State administrations, Spain's Representative on the ICAO Council and ICAO's Accident Investigation and Prevention Section Bureau Chief. Delegates from the industry (airports, airlines), the European Commission, States beyond the ECAC region (Israel, Saudi Arabia, Singapore, United States) and civil society organisations also played an active part in the workshop.

ECAC Workshop in Malaga



Marcus Costa, Chief of ICAO's Accident Investigation Section

Victims' families associations (Air Crash Victims' Families Federation International, Association Affected Flight JK5022, Airblue Crash Affectees Association, Asociación de afectados del vuelo GW19525) shared their experiences of such tragedies, and their recommendations. The day before the workshop, participants attended an emergency drill at Malaga Airport in which all the parties involved in the event of an air accident took part (airport staff, police, fire brigades, etc.). The purpose was to demonstrate existing procedures and the use of the facilities designed to welcome and assist families when an accident occurs.

▶ Directors General gather in Bratislava for their annual Special meeting

From 31 August to 3 September, ECAC Directors General, joined by representatives from observer organisations EASA, EUROCONTROL and the European Commission, met in Bratislava at the kind invitation of the Republic of Slovakia, which currently holds the European Council Presidency. Newly appointed Slovak Transport Minister Arpad Ersek welcomed the delegates in his opening address, the first in his new capacity. Also in attendance, ICAO Secretary General Fang Liu expressed how she hoped to see an increased partnership develop with regional organisations, and ICAO's appreciation of Europe's progress and commitment to further civil aviation's security, safety and sustainability. An open exchange with European Directors General ensued, during which discussions tackled objectives, concerns and challenges for the next ICAO Assembly (27 September – 7 October).

This topic continued to be at the centre of discussions, as Directors General were meeting together for the last time before Montreal. Henrik Hololei, European Commission Director General for Mobility and Transport, joined the meeting to address Europe's commitment to CO₂ emissions reductions and the strategy to reach an agreement on a global market-based measures scheme at the ICAO Assembly. On other issues, Directors General also received updates on the most recent EU developments, reviewed progress made on various activities, on-going projects and upcoming events, such as the ninth ECAC Forum (6 December 2016) and the tenth ECAC/EU Dialogue (27-28 June 2017). Europe will intensify its co-ordination during the course of September to meet again at the ICAO Assembly at the end of the month.



▶ Endorsement of the Bratislava Declaration at ECAC's sixty-fifth Special meeting: ECAC States to join GMBM scheme from the start

In the context of Europe's engagement to reduce CO₂ emissions and in line with the Paris Agreement at COP21, ECAC Directors General endorsed a common declaration, the 'Bratislava Declaration', on Saturday, 3 September in which they confirmed their intent "to implement the global market-based measure scheme for international aviation from the start". The full text of the Bratislava Declaration is available on the ECAC website.



Top: View of Bratislava
 From left to right: Arpad Ersek, Transport Minister for Slovakia, Ingrid Cherfils, ECAC president, Salvatore Sciacchitano, ECAC Executive Secretary, Fang Liu, ICAO Secretary General
 ECAC Directors General for Civil Aviation meeting in Bratislava





► Events to come

SEPTEMBER

- 19-20/ Twenty-fourth meeting of the Study Group on Cyber Threats to Civil Aviation, Paris
- 20/ Eighteenth meeting of the ad hoc co-ordination group on security, Brussels
- 21-22/ EU AVSEC Committee, Brussels
- 22/ Twenty-third meeting of the Co-ordination Group on Market-Based Measures, video conference
- 22-23/ Thirty-third meeting of the Training Task Force, Paris
- 27-07/ Thirty-ninth Session of ICAO Assembly, (Oct) Montreal

OCTOBER

- 5-7/ Sixty-fifth meeting of the Technical Task Force, Paris
- 11/ Forty-second meeting of the Facilitation Sub-group on Immigration, Paris
- 12-13/ Twenty-fifth meeting of the ANCAT Sub-Group on Aircraft Noise Modelling, Copenhagen
- 13/ Twenty-fourth meeting of the ANCAT Modelling and Interdependencies Task Force, Paris
- 17/ Workshop on Cyber Security, Podgorica
- 18-19/ Twenty-second Security Forum, Budva
- 20/ Workshop on Best Practices in Persons with Reduced Mobility Monitoring Activities for National Authorities, Lisbon
- 21/ Fifty-eight meeting of the Facilitation Sub-Group on Persons with Reduced Mobility, Lisbon

NOVEMBER

- 1/ Thirty-first meeting of the Common Evaluation Process Management Group
- 2/ Seventh meeting with security equipment manufacturers concerned by the Common Evaluation Process
- 3/ Twenty-fourth meeting of the Security Programme Management Group, Rome
- 4/ Fiftieth meeting of the ECAC Medium-Term Objectives (EMTO) Task Force, Rome
- 8/ Fifty-third meeting on the Facilitation Working Group, Paris
- 9-10/ Workshop on Unpredictability in Aviation Security, Paris

► First CASE Project Regional Workshop on Cargo and Mail Security

The Civil Aviation Security in Africa and the Arabian Peninsula (CASE) Project, a four-year EU-funded and ECAC-implemented initiative launched in 2016, held its first two-day workshop on Cargo and Mail Security on 26 and 27 July in Abidjan, Republic of Côte d'Ivoire.

The event was jointly organised by ECAC and the West African Economic and Monetary Union (WAEMU) and hosted by the National Civil Aviation Agency (ANAC) of Côte d'Ivoire, whose director of administrative and financial affairs, Mr Doumbia Yahaya, delivered a welcome address.

Introduced by Tcha-Djidoré Bah-Traoré (WAEMU) and moderated by Anne Dureau (ECAC), topics including current threats and challenges to cargo security, cargo screening and the status of regulated agents and known consignors were presented by aviation security experts from ECAC, the Netherlands and Portugal, as well as the cargo industry. Twenty-eight participants from 11 countries attended the workshop and engaged in lively discussion during the breakout sessions.

The second CASE Project's regional workshop, which is being jointly organised with the African Civil Aviation Commission (AFCAC), focused on security equipment and technology and took place in Dakar, Senegal on 6-7 September 2016.

- 9-10/ Forty-fifth meeting of the Group of Experts on Accident Investigation, Milan
- 15-16/ Ninetieth meeting of the Group of Experts on the Abatement of Nuisances caused by air transport, The Hague
- 16-17/ EU AVSEC, Brussels
- 17/ Twenty-fifth meeting of the ANCAT Modelling and Interdependencies Task Group, Cologne
- 22/ One hundred and seventy-eighth meeting of the ECAC Co-ordinating Committee, Paris
- 23/ Fourth meeting of the Economic Working Group, Paris

News from the JAA Training Organisation (JAA TO)



ASSOCIATED BODY OF ECAC

JAA TO is pleased to announce that the ECAC Co-ordinating Committee appointed Mario Nemeth, Director General for Civil Aviation for Slovakia, as the fourth member of its Foundation Board. Mr Nemeth joins Alessio Quaranta, Director General for Civil Aviation for Italy, Bilal Eksi, Director General for Civil Aviation for Turkey, and Salvatore Sciacchitano, ECAC Executive Secretary, at the JAA TO Foundation Board.

► Environment – what is it all about?

This latest edition of 'ECAC News' focuses on the subject of climate change, which is a major issue for aviation and the object of much activity as we approach the next ICAO Assembly. Our community is expected to make further decisions on how it will address the reduction of emissions from international aviation and, in particular, on the adoption of some form of global measure to achieve this end.

Unless you are dealing with environmental issues on a day-to-day basis, you might be wondering why the aviation community is so concerned about climate change or indeed about any of the other dangers human activity poses for the environment. Well, it is important to understand that these issues are very relevant to each and every one of us.

Civil aviation has its own particular environmental impacts and has been under pressure to do something about them for many years. Local residents have long complained about noise around airports and it is still an obstacle to airport expansion. In recent decades, attention has also turned to engine emissions and the effects they have on local air quality, on people's health and on the atmosphere. Everyone working in the aviation sector therefore needs to understand both our place in the environment debate and what is being

done to address an important issue that affects all of us, whatever our function or organisation. There is no single answer to any of our environmental problems and we need joint action by everyone to achieve the necessary solutions.

To help understand this whole issue, JAA TO offers two courses on the subject:

- The one-day 'Environment Awareness' course seeks to give an easy introduction to the general subject of the environment and to the specific environmental issues for civil aviation, without going into technical or policy detail. It is intended for anyone working in civil aviation irrespective of their role, so that they might understand why this is a subject everyone should know about.
- The two-day 'Aviation and the Environment' course is intended for those who might have specific environmental duties or the responsibility of supervising such staff. It provides more detail than the one-day course, in particular on technical aspects and on important policy at the European and international levels.

Further details are available on JAA TO's website (www.jaato.com) and we hope you will take advantage of one of these courses.

► New RPAS (drones) - OPS course

Besides our 'RPAS (Drones) Requirements - Initial' training course, we introduce the 'RPAS (drones) - OPS course'.

This new course focuses on what the operators need to know to legally and safely fly drones for non-military purposes.



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► First EASA Virtual Academy training course

After becoming the very first EASA e-Examination provider, and nowadays the largest one too, JAA TO has also become the first EASA EVA Member to deliver an EASA Virtual Academy training course to a civil aviation authority. The “NAA Inspectors Aerodromes” training course was delivered in mid August at the client’s location.

Upcoming open EASA Virtual Academy training courses to be held at JAA TO Hoofddorp, the Netherlands:

- 12-16 September 2016 - NAA Inspectors Training Course - **Flight Operations Inspector**

- 13-15 September 2016 - NAA Inspectors Training Course - **Initial Airworthiness**
- 26-28 September 2016 - NAA Inspectors Training Course - **Continuing Airworthiness**
- 21-25 November 2016 - NAA Inspectors Training Course - **Aerodrome Safety Regulation (Basic)**
- 5-9 December 2016 - NAA Inspectors Training Course - **Flight Operations Inspector**
- 12-15 December 2016 - NAA Inspectors Training Course - **Aircrew/FSTD**
- 23-27 January 2017 - NAA Inspectors Training Course - **Aircrew/Licensing**

► Small selection of completed courses



> **ICAO SMS and EASA MSR**
30 May 2016 - 1 June 2016 in the Netherlands



> **EASA Basic Regulation - Total System Approach**
13 - 14 June 2016 in the Netherlands



> **EASA Air Ops - CAT for Aeroplanes**
14 - 16 June 2016 in Turkey



> **Incident Investigation Training Course**
20 - 22 June 2016 in the Netherlands



> **Successful Presentation Techniques Training Course**
27 - 29 June 2016 in the Netherlands



> **IR Part-M, Subparts G and I Training Course**
29 - 30 June 2016 in the Netherlands

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