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INTERNATIONAL CIVIL AVIATION ORGANIZATION

Beijing Achievements

The 2010 Beijing Diplomatic Conference Adopts Important New International Counter-terrorism Instruments

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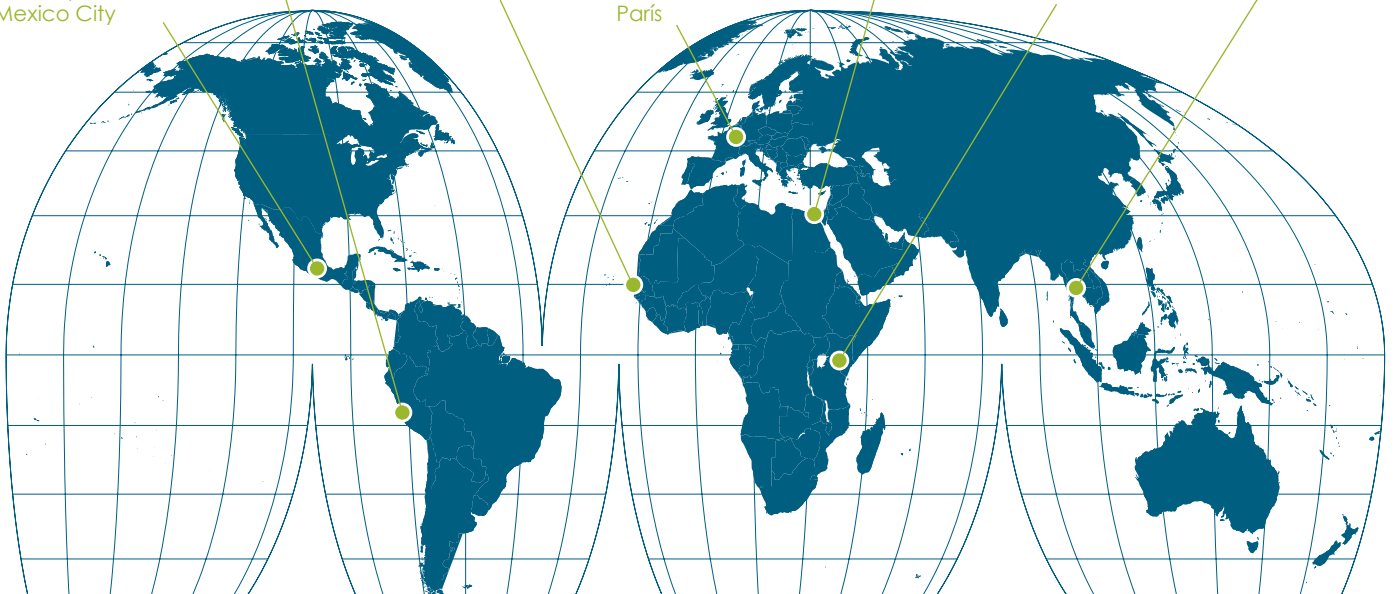
Establishing a New Era of Consensus and Action on Global Aviation Security Priorities

This issue of the ICAO Journal highlights a landmark achievement in the areas of civil aviation law and security: the development of two new treaties at a Diplomatic Conference in Beijing in the fall of 2010 that criminalize a comprehensive range of terrorism-related activities and actions—including those that led to the destruction of New York's World Trade Center on 11 September 2001 (9/11).

This remarkable legal accomplishment, in conjunction with the unanimous adoption at the recent 37th ICAO General Assembly of a new Declaration on Aviation Security, have served to make 2010 one of the most important years in the history of international cooperation on the protection of the air transport system. The Conference's achievements have leveraged and built-on the strong global consensus that was generated post-9/11 to strengthen and modernize every aspect of global aviation security and related legal regimes.

Security first arose as a serious issue for international aviation in the 1960s, when criminal individuals and groups first began to threaten aircraft and their passengers for personal or political gain. Responding to this new phenomenon of aircraft hijackings and the complex legal ramifications they posed, in 1963 States adopted the new Tokyo Convention as the first worldwide international legal instrument on aviation security, providing clearer guidelines on the security of inflight passengers and property and concluding decades of debates and negotiations surrounding jurisdiction issues and some of the foremost outstanding problems in international air law.

The Tokyo Convention entered into force in 1969 and, shortly afterward, the 1970 Hague Convention and the 1971 Montreal Conventions further broadened the criminalization of specific acts and behaviours involving aircraft and their passengers.

In the years since, ICAO has become the world leader in developing aviation security policies and measures at the international level, and the enhancement of aviation security worldwide remains a key objective of the Organization.

Provisions for international aviation security were first introduced into the Chicago Convention in 1974 as Annex 17—Security, and since then have been improved

> **"The Beijing Convention and Beijing Protocol, together with the Assembly Security Declaration, highlight more than anything else the strength and scope of the political will which exists today in support of more robust, comprehensive and collaborative aviation security and legal frameworks. "**

and updated 11 times. The latest 12th amendment to Annex 17 was recently approved by the ICAO Council and is on track to be applicable as of 1 July 2011.

ICAO has also provided States with guidance material to assist with the implementation of the security measures contained in Annex 17, foremost among these documents being the *Security Manual for Safeguarding Civil Aviation against Acts of Unlawful Interference* (Doc 8973–Restricted).

Initially, ICAO's security-related work focused on developing Standards and Recommended Practices (SARPs) for inclusion in Annex 17. Over the years, its work in the field of aviation security has broadened and today is essentially carried out in three inter-related areas: policy initiatives, audits focused on the capability of Contracting States to oversee their aviation security activities, and assistance to States that are unable

to address serious security deficiencies highlighted by audits.

All of these security-related services and functions are integrated in the Organization's Aviation Security Branch.

Security audits are performed under the Universal Security Audit Programme, which is managed by the Aviation Security Audit (ASA) Section. Short-term or urgent security-related assistance to States is facilitated by the Implementation Support and Development–Security Section (ISD-SEC Section), with longer term project assistance available where warranted from the ICAO Technical Co-operation Bureau.

ICAO's other activities in the field of aviation security include efforts to enhance the security of travel documents and improve the training of security personnel. In addition, ICAO provides support for regional security initiatives with the aim of strengthening aviation security globally.

Travel document security is addressed by the Machine Readable Travel Document (MRTD) Programme. Under this initiative, ICAO developed the worldwide standard for Machine Readable Passports (MRPs). Over 170 States had issued MRPs that comply with the ICAO standard by 1 April 2010, the deadline for achieving compliance.

ICAO is also concerned with the facilitation of international air transport, which involves the expeditious passage of passengers, crews, baggage, cargo and mail across international boundaries. Closely aligned with security processes, facilitation matters are addressed by the Facilitation (FAL) Programme.

Highlights of the Organization's security-related priorities moving forward include identifying and preventing new forms of attack before they occur, streamlining security checks so that they remain effective but are not duplicated unnecessarily, and improving the capabilities of all States to implement and oversee effective aviation security measures. In the area of MRTD and e-Passport initiatives, ICAO is also working to address weaknesses in the global identity establishment and management frameworks in cooperation with Member States.

The Beijing Convention and Beijing Protocol, together with the Assembly Security Declaration, highlight more than anything else the strength and scope of the political will which exists today in support of more robust, comprehensive and collaborative aviation security and legal frameworks.

These recent accomplishments underscore the important role of ICAO in leading many collaborative international efforts in the aviation security and legal domains. It is a role and a responsibility that ICAO will continue to fulfil as we progress towards a more proactive, effective and efficient global aviation security framework. ■

Raymond Benjamin
ICAO Secretary General

Leadership and Vision
in Global Civil Aviation

Widening the Net

ICAO's Beijing Diplomatic Conference Results in Two New Treaties that Greatly Expand and Advance International Aviation Counter-Terrorism Objectives

In late 2010, an ICAO Diplomatic Conference in Beijing adopted two new counter-terrorism treaties devoted to improving aviation security and criminalizing the 9/11 offenses: the *Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation;* and the *Supplementary Protocol to the 1970 Hague Convention for the Suppression of Unlawful Seizure of Aircraft.*

Some 400 participants from more than 80 States and international organizations attended the event, and the new Beijing Convention and Protocol they produced will significantly strengthen existing international counter-terrorism legal instruments while facilitating the prosecution and extradition of those who seek to commit acts of terror. The treaties received nearly 20 signatures immediately and are steadily attracting more.

Whereas these new treaties reflect the shared and committed efforts of the Organization and the international community in recent years to prevent, prosecute, and punish those who would carry out violent acts against aviation targets, it is only when the Beijing treaties have been ratified and incorporated into national legislations that their full benefits will be felt. The last ICAO Assembly therefore adopted a Resolution calling on States to enact appropriate legislation as quickly as possible, and it is expected that by the next Assembly in 2013 both the 2010 Beijing Convention and Protocol will have achieved significant levels of international adoption.

Aviation security has historically been one of ICAO's most consistent and guiding Strategic Objectives. Under the Organization's auspices, five security-related international treaties had been adopted and almost universally accepted by ICAO's Member States prior to the two new Beijing accomplishments.

The abhorrent attacks on 11 September 2001 (9/11), as well as subsequent terrorist plots such as the infamous PETN 'Christmas Bomber' of 2009, continue today to underscore the need for determined vigilance in air transport security enforcement and even stronger international frameworks under which terrorists and terrorist acts can be effectively prosecuted.

While enforcement action and solutions have progressed at pace with existing and emerging threats over air transport's history, the agreement of commensurate and binding

1. **Criminalization of the following acts:**
   - Using civil aircraft as a weapon to cause death, injury or damage.
   - Using civil aircraft to discharge biological, chemical and nuclear (BCN) weapons or similar substances to cause death, injury or damage.
   - Using BCN weapons or similar substances to attack civil aircraft.
   - Unlawful transport of BCN weapons or certain related material.
   - Unlawful transport of explosive or radioactive material for terrorist purposes;
   - A cyber attack on air navigation facilities.

2. **Establishment of the following regimes within the scope of the instruments:**
   - A threat to commit an offence is an offence by itself, if the threat is credible.
   - Conspiracy to commit an offence, or its equivalent, is punishable.
   - It is also an offence to assist an offender to evade investigation, prosecution or punishment.
   - A legal entity may be criminally liable, if the applicable national law so provides.
   - A State must establish jurisdiction if the alleged offender is its national, and may have jurisdiction if the victim of the offence is its national.
   - Fair treatment in the legal process is guaranteed for the alleged offender.
   - No discrimination is allowed on the ground of race, religion, nationality, ethnic origin, political opinion or gender.

3. **Incorporation of the following principles:**
   - Any offence under the instruments should not be considered as a political offence.
   - The directors and organizers of an offence must be criminally accountable.
   - The activities of armed forces are not governed by these instruments, if they are governed by other rules.

Courtesy of Jiefang Huang, ICAO Senior Legal Officer
Deputy Secretary of the Diplomatic Conference

international legal instruments regarding terrorism and terrorists has proven more difficult due to the complex political factors involved. It is only when the scale of these political complexities is underscored that the significance of the legal accomplishments of the recent ICAO Beijing Diplomatic Conference can be properly contextualized and appreciated.

"Terrorism is perhaps the most challenging legal realm in which to achieve broad international consensus," began ICAO Legal Affairs and External Relations Bureau Director and Secretary General of the Beijing Conference, Denys Wibaux. "Given the scale and complexity of the challenges involved in designing and ratifying effective legal instruments governing counter-terrorism, it is perhaps not surprising that the international aviation community, which has historically demonstrated a uniquely high degree of cooperative achievement, should now find itself assuming a vital role in helping

to determine effective and implementable legal tools in this area. In this regard the success of the Beijing Conference, not to mention the determined process that culminated in its achievements, cannot be underestimated."

A Landmark Aviation Legal and Security Achievement

The Beijing Convention and Beijing Protocol of 2010, adopted and opened for signature just two weeks before the opening of the 2010 Assembly session, broaden and strengthen the global civil aviation anti terrorism framework. Their universal adoption will significantly advance cooperation in the prevention of the full range of unlawful acts relating to civil aviation and the prosecution and punishment of offenders.

In many ways these new legal tools complement and support the practical, hands-on aviation security measures

and objectives that were agreed at the 2010 Assembly under the context of its Special Declaration on Aviation Security.

The Beijing Convention will succeed and improve provisions in the *Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation* (the Montreal Convention of 1971) and its amending *Airports Protocol of 1988* as between States Parties. The Beijing Protocol, meanwhile, amends the *Convention for the Suppression of Unlawful Seizure of Aircraft* (the *Hague Convention of 1970*) as between States Parties.

The underlying treaties are widely ratified and have stood the test of time, but many of their provisions could benefit from some updating due to the changes which have occurred during the intervening four decades since their adoption.

"The new Beijing Convention and

Protocol, taken together, effectively establish a much broader and stronger civil aviation security framework," stressed Wibaux. "Terrorist acts against civil aviation are a continuing and significant threat to global political and economic stability. As a promising start, the Beijing Convention received 18 signatures on the day it was adopted, and the Beijing Protocol received 19, and we are confident that the new treaties will receive the widest possible support with the greatest possible speed. Their adoption was a great success for civil aviation, but they will be truly successful only when they are widely implemented into local State legislation."

The new treaties adopted in Beijing, which bring ICAO's total security-related treaty count to seven, further criminalize the act of using civil aircraft as a weapon, and of using dangerous materials to attack aircraft or other targets.

Making a threat to commit an offence under the treaties may trigger criminal liability, when the circumstances indicate that the threat is credible. Under certain conditions, agreement or contribution to an offence, whether such an offence is actually committed or not, may also be punishable. The Beijing instruments therefore specifically criminalize the mere act of a conspiring to undertake an attempt against civil aviation, introducing the legal concepts of 'conspiracy' in Common law countries and 'association de malfaiteurs' in Civil law countries. The treaties update provisions to promote cooperation between States in combating the unlawful acts directed against civil aviation, while emphasizing the human rights and fair treatment of any suspects.

The Beijing Convention of 2010 will also require States to criminalize the transport of biological, chemical, nuclear weapons and related material. These provisions reflect the nexus between proliferation of weapons of mass destruction and terrorism, and ensure that the international community will act to combat both. This treaty will strengthen global efforts to ensure that these extraordinarily dangerous materials will not be transported via civil aircraft for illicit purposes and, if such attempts are made, those responsible will be held accountable under the law.

Diplomatic Conference on Aviation Security
30 August - 10 September, 2010 Beijing, China

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One important distinction to underscore from an industry standpoint is that passengers and operators cannot be charged with transporting biological, chemical or nuclear (BCN) materials unless they can be demonstrated to have been doing so *intentionally.* The *unintentional* transport of BCN materials has not been criminalized under the new Beijing instruments.

"While stakeholders have achieved new legal definitions that are at once practical and comprehensive in this manner, it cannot be overstated how urgent it is that ICAO's Member States respond to the ratification needs of these new Beijing treaties as quickly as possible," stressed ICAO Council President Roberto Kobeh González. "The recent Assembly Resolution was a first success in this regard, but States must also recognize and appreciate the level of threat involved and the strong need to progress State ratifications with a higher priority than is usually the case. I am confident that there is a strong degree of political will among Member States to respond to the leadership and success that ICAO has

achieved in producing these landmark legal instruments."

It must be highlighted that the United States, China and the United Kingdom, among other States, signed the 2010 Beijing instruments on the spot. A special message from Beijing Conference President Xia Xinghua, praising the process and stressing the strong support of his country can be found on the following page.

In the United States, meanwhile, efforts are also being made to ensure that the new Beijing treaties are given the full degree of international priority that they deserve.

"We've been very supportive of the process throughout and obviously very encouraged by the results of the Beijing Conference," commented FAA Assistant Chief Counsel for International Affairs and Legal Policy, Michael Jennison. Jennison has been intimately involved with aviation security advances since 9/11, when he spent the entire day watching events unfold in the FAA's Emergency Operations Center. Since then, among other

responsibilities, he has served on the U.S. Delegation to the ICAO High-Level Security Conference in February of 2002, acted as a U.S. Delegate on the Special Subcommittee of the ICAO Legal Committee on the Preparation of One or More Instruments Addressing New and Emerging Threats (the stepping stone to the Beijing Convention and Protocol), and chaired the ICAO Legal Committee as it finalized the texts that served as the basis of the Beijing deliberations. Jennison was also one of two Alternate Chief Delegates of the U.S. Delegation in Beijing.

"It should be stressed that the U.S. can be very active at the international level in pursuit of important goals," Jennison continued. "For instance when Article 83 bis of the Chicago Convention was pending entry into force, the United States regularly held workshops along with The Netherlands on the amendment and its ratification process. We did this at ICAO Assembly sessions, ICAO Legal Committee meetings and regional legal seminars and other meetings, and we're going to be looking to revive a similar process

Statement from Xia Xinghua President of the Beijing Diplomatic Conference

The Beijing Diplomatic Conference on Aviation Security, based on its review and discussion at the diplomatic level of the Montreal Convention of 1971 and the Hague Convention of 1970, adopted accordingly the *Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation* (the Beijing Convention) and the *Protocol Supplementary to the Convention for the Suppression of Unlawful Seizure of Aircraft* (the Beijing Protocol). To date, 20 States have signed the Beijing Convention and 22 States have signed the Beijing Protocol.

Drawing positive experience from other international conventions on counter-terrorism, these two legal instruments have further expanded the coverage of different forms of offences against civil aviation by criminalizing certain acts, such as using civil aircraft as a weapon or employing dangerous materials to attack aircraft or other targets. These instruments strengthen the crackdown on offenders and include clauses for fair treatment and other associated concerns, thereby representing a collaborative and concrete action by the global civil aviation community to ensure that the global air transport system stays clearly focused on protecting the safety and security of aircraft and passengers. The adoption of the two Beijing instruments will provide a stronger legal safeguard to help combat global terrorism and will enhance to the fullest degree possible the safety of international air transport. These accomplishments demonstrate the firm determination of international society to combat terrorism and will undoubtedly serve to reinforce public confidence in air travel.

As a founding Member of the International Civil Aviation Organization, China has always lent its support to ICAO activities in the aviation security field and has participated actively in all security-related legislative and audit-based processes. China's hosting of the ICAO Diplomatic Conference on Aviation Security itself has shown that its Government continues to attach great importance to aviation security priorities and that it is willing to actively contribute to increasing the level and capability of international aviation stakeholders in promoting the ICAO strategic objective for aviation security.

On the road to ensuring the ongoing safe and secure development of international civil aviation, no matter how big or small the related steps may be, the advances being made reflect positive collaborative progress on behalf of the world community. The Chinese Government will continue to work together with other ICAO Member States, making its due contribution to ensure the safety and security of international air transportation.

Conference President Xia Xinghua (centre) with ICAO Council President Roberto Kobeh González (right) and Beijing commision Chairman Terry Olson, Member of the French Conseil d'état and Advisor to the French Director General of Civil Aviation (left).

to promote ratification of the Beijing Convention and Protocol of 2010, along with the Montreal Convention of 1999, which we view as two very important and sweeping legal frameworks that both deserve to be universally observed."

Jennison also noted that ICAO, in its role as a UN Specialized Agency, is uniquely suited to develop binding global security conventions and to serve as a world leader of developments of this nature.

"Much of what has been accomplished by ICAO will now serve to assist complementary UN efforts in this area," he concluded. "For the United States this Convention and Protocol are both significant and symbolic in that they finally criminalize the 9/11 offenses — most especially those provisions relating to the organizing, directing, financing and conspiring activities that support the actual terrorist acts. The old Montreal Convention had included an 'accomplice' provision but the accomplice had to be physically on board the aircraft to be criminally responsible. These new Beijing instruments provide for improved enforcement and prosecution of the non-centralized terrorist networks and support systems that we're dealing with today."

One of the unforgettable facts of 9/11 is that civil aircraft, which have become one of the essential means of transportation in modern society, were used and diverted by terrorists to become powerful weapons of destruction. These acts were the aggregation of various offences, such as the unlawful seizure of an aircraft in flight, the intentional destruction of an aircraft in service, acts of violence on board aircraft, murders, and other criminal acts causing injuries and damage.

While the provisions of the existing aviation security instruments cover various components of these offences, they do not specifically address the aggravated aspects of diverting civil aircraft in service into weapons of destruction. Deliberately using a hijacked aircraft to murder innocent people in the air or on the ground or to cause serious damage constitutes a criminal act of immense gravity which is utterly different from a simple hijacking for such purposes as smuggling or immigration, without causing death or serious injury.

Lead-up to the Beijing Accomplishments

Since the 1960s, ICAO has made pioneering efforts to combat unlawful interference against civil aviation, leading to the adoption of five worldwide multilateral treaties relating to aviation security. In 1963, the Tokyo Convention was adopted as the first worldwide international legal instrument on aviation security. These instruments, along with Annex 17 of the *Convention on International Civil Aviation,* constitute a solid legal framework for aviation security.

The five treaties adopted through ICAO have achieved very wide acceptance and form a significant part of the sixteen worldwide international treaties related to the prevention and suppression of terrorism. All of these instruments were concluded decades ago, however, and many aspects of them required modernization.

The more specific legal process which culminated in the new Beijing Convention and Protocol of 2010 traces its origins back to the 9/11 attacks of 2001 and the swift response from States and

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ARTICLE 1 OF THE NEW BEIJING CONVENTION

1. Any person commits an offence if that person unlawfully and intentionally:

   (a) performs an act of violence against a person on board an aircraft in flight if that act is likely to endanger the safety of that aircraft; or

   (b) destroys an aircraft in service or causes damage to such an aircraft which renders it incapable of flight or which is likely to endanger its safety in flight; or

   (c) places or causes to be placed on an aircraft in service, by any means whatsoever, a device or substance which is likely to destroy that aircraft, or to cause damage to it which renders it incapable of flight, or to cause damage to it which is likely to endanger its safety in flight; or

   (d) destroys or damages air navigation facilities or interferes with their operation, if any such act is likely to endanger the safety of aircraft in flight; or

   (e) communicates information which that person knows to be false, thereby endangering the safety of an aircraft in flight; or

   (f) uses an aircraft in service for the purpose of causing death, serious bodily injury, or serious damage to property or the environment; or

   (g) releases or discharges from an aircraft in service any BCN weapon or explosive, radioactive, or similar substances in a manner that causes or is likely to cause death, serious bodily injury or serious damage to property or the environment; or

   (h) uses against or on board an aircraft in service any BCN weapon or explosive, radioactive, or similar substances in a manner that causes or is likely to cause death, serious bodily injury or serious damage to property or the environment; or

   (i) transports, causes to be transported, or facilitates the transport of, on board an aircraft:

      (1) any explosive or radioactive material, knowing that it is intended to be used to cause, or in a threat to cause, with or without a condition, as is provided for under national law, death or serious injury or damage for the purpose of intimidating a population, or compelling a government or an international organization to do or to abstain from doing any act; or

      (2) any BCN weapon, knowing it to be a BCN weapon as defined in Article 2; or

      (3) any source material, special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material, knowing that it is intended to be used in a nuclear explosive activity or in any other nuclear activity not under safeguards pursuant to a safeguards agreement with the International Atomic Energy Agency; or

      (4) any equipment, materials or software or related technology that significantly contributes to the design, manufacture or delivery of a BCN weapon without lawful authorization and with the intention that it will be used for such purpose;

   provided that for activities involving a State Party, including those undertaken by a person or legal entity authorized by a State Party, it shall not be an offence under subparagraphs (3) and (4) if the transport of such items or materials is consistent with or is for a use or activity that is consistent with its rights, responsibilities and obligations under the applicable multilateral non-proliferation treaty to which it is a party including those referred to in Article 7.

aviation stakeholders to the scale of the tragedy and the unprecedented assault on innocent life they represented.

As a first and immediate response to the 9/11 events, the 33rd Session of the ICAO Assembly adopted Resolution A33-1, which directed the Council and the Secretary General to address the new and emerging threats to civil aviation, and, among other things, to review the adequacy of the existing aviation security conventions.

Pursuant to this Resolution, the Secretariat undertook a study and drew a preliminary conclusion that the existing conventions should be updated in several aspects in order to cover new and emerging threats. This conclusion was endorsed by a large number of States through a survey in 2005 and by the Secretariat Study Group on Aviation Security Conventions.

Based on these results, and taking into account the law making processes in other fora of the United Nations system, the ICAO Legal Committee established the Special Sub-Committee on the Preparation of One or More Instruments Addressing New and Emerging Threats in 2007, appointing Julie Atwell from Australia as Rapporteur and France's Terry Olson as Chairman.

Under the chairmanship of Olson, who serves as a Member of the French Conseil d'état and as an Advisor to the French Director General of Civil Aviation, the Sub-Committee reached broad consensus on a number of issues, including the criminalization of acts such as using civil aircraft in service as a weapon and employing dangerous materials or substances to attack aircraft or other targets on the ground.

ARTICLE 1 OF THE NEW BEIJING CONVENTION (CONTINUED)

2. Any person commits an offence if that person unlawfully and intentionally, using any device, substance or weapon:

   (a) performs an act of violence against a person at an airport serving international civil aviation which causes or is likely to cause serious injury or death; or

   (b) destroys or seriously damages the facilities of an airport serving international civil aviation or aircraft not in service located thereon or disrupts the services of the airport, if such an act endangers or is likely to endanger safety at that airport.

3. Any person also commits an offence if that person:

   (a) makes a threat to commit any of the offences in subparagraphs (a), (b), (c), (d), (f), (g) and (h) of paragraph 1 or in paragraph 2 of this Article; or

   (b) unlawfully and intentionally causes any person to receive such a threat, under circumstances which indicate that the threat is credible.

4. Any person also commits an offence if that person:

   (a) attempts to commit any of the offences set forth in paragraph 1 or 2 of this Article; or

   (b) organizes or directs others to commit an offence set forth in paragraph 1, 2, 3 or 4(a) of this Article; or

   (c) participates as an accomplice in an offence set forth in paragraph 1, 2, 3 or 4(a) of this Article; or

   (d) unlawfully and intentionally assists another person to evade investigation, prosecution or punishment, knowing that the person has committed an act that constitutes an offence set forth in paragraph 1, 2, 3, 4(a), 4(b) or 4(c) of this Article, or that the person is wanted for criminal prosecution by law enforcement authorities for such an offence or has been sentenced for such an offence.

5. Each State Party shall also establish as offences, when committed intentionally, whether or not any of the offences set forth in paragraph 1, 2 or 3 of this Article is actually committed or attempted, either or both of the following:

   (a) agreeing with one or more other persons to commit an offence set forth in paragraph 1, 2 or 3 of this Article and, where required by national law, involving an act undertaken by one of the participants in furtherance of the agreement; or

   (b) contributing in any other way to the commission of one or more offences set forth in paragraph 1, 2 or 3 of this Article by a group of persons acting with a common purpose, and such contribution shall either:

      (i) be made with the aim of furthering the general criminal activity or purpose of the group, where such activity or purpose involves the commission of an offence set forth in paragraph 1, 2 or 3 of this Article; or

      (ii) be made in the knowledge of the intention of the group to commit an offence set forth in paragraph 1, 2 or 3 of this Article.

It also reached agreements so as to explicitly specify the criminal responsibility of the directors and organizers of the offences set forth by the Conventions. Moreover, a new notion also emerged concerning the criminalization of a credible threat to commit an offence listed in the Conventions.

"It must be underscored that the aviation sector benefited extraordinarily from the fact that it was able to progress these treaties based on the provisions already established in instruments such as the Montreal Convention of 1971," began Olson. He also chaired the main body of the Beijing Conference responsible for delineating and deliberating the major points of its discussions, referred to in the legal realm as the 'Commission of the Whole'. "The 1970 Hague Convention and the 1971 Montreal Conventions follow a legal approach that proved to be helpful. They both criminalize acts and behaviours, regardless of the motives of those who commit such acts, and are therefore capable of being applied both when criminals act either to earn money or promote an ideology. This legal foundation saved the Beijing Diplomatic Conference from being bogged down in the political minefield of having to define the concept of terrorism."

Based on the most recent UN counter-terrorism instruments, provisions relating in particular to non-discrimination, exclusion of the political offence exception, and additional jurisdictional grounds were also introduced into the Beijing instruments.

On the basis of the drafts prepared by the Sub-Committee, the 34th Session of the Legal Committee further refined the texts and considered them to be sufficiently mature to be submitted to what eventually became the very successful Beijing Diplomatic Conference.

"Besides the benefits accruing from the specific offenses in the existing Conventions, this process also had a great deal of political will supporting it," remarked Olson. "ICAO must absolutely be praised for having been able to convene a Legal Committee and a successful Diplomatic Conference in what has been a very short timeframe by international legal standards, but there was also a lot of motivation within some very important States to see that this process moved forward with more urgency than usual and this was also a big part of the Beijing success story."

Conclusion

The *Beijing Convention* and *Beijing Protocol of 2010* will require parties to criminalize a number of new and emerging threats to the safety of civil aviation, including using aircraft as a weapon and organizing, directing and financing acts of terrorism. These new treaties reflect the international community's shared effort to prevent acts of terrorism against civil aviation and to prosecute and punish those who would commit them. The treaties promote cooperation between States while emphasizing the human rights and fair treatment of terrorist suspects.

"We need to send a clear message to the international community, and to terrorist groups, that any form of unlawful interference against civil aviation is not tolerable," summarized ICAO's Roberto Kobeh González during his remarks to the Beijing Delegates. "With these new Beijing treaties aviation has constructed a new 'great wall' that will both deter terror networks from targeting the lives of innocent aviation passengers, as well as safeguarding international civil aviation more effectively from all types of new and emerging terrorist acts." ∎

THE 9/11 CONNECTION TO THE NEW BEIJING CONVENTION

Immediately following the 9/11 terrorist attacks, the 33rd ICAO Assembly passed Resolution A33-1, which directed the Council and the Secretary General to address new and emerging threats to civil aviation and to review the adequacy of existing aviation security conventions. These first principles and directives eventually formed the basis of the process that has now culminated in the Beijing Convention and Protocol of 2010.

NGAP 2010 Symposium Part II: Pilots and Flight Crews

The Next Generation Aviation Professionals (NGAP) Symposium in 2010 proposed specific actions in two areas: the updating and modification of the regulatory environment in order to improve the effectiveness and efficiency of training and education; and the mobilization of the air transport community toward a common effort to 'revitalize' the image of aviation professions.

These challenges were addressed at last year's event by ten separate Panels made up of experts and specialists representing the full range of air transport stakeholders, including civil aviation authorities, airlines, ANSPs, training and education providers and other international organizations.

The following is the second of the *Journal's* three-part series on the NGAP Symposium results, focusing on this occasion on the challenges that will need to be addressed to ensure that both the quality and quantity of aircraft flight crews will be sufficient to meet industry needs over the coming decades.

In Steven Spielberg's entertaining film biography, *Catch Me if You Can,* famous con artist Frank Abignale Jr. spends a great deal of time passing himself off as a Pan Am co-pilot.

True to the era being depicted (the 1960s), and all fraudulence regarding his credentials and capabilities aside, almost as soon as Abignale (portrayed by Leonardo DiCaprio) first dons the cap and wings of a commercial pilot, his entire universe changes seemingly before his eyes. Where before he may have been a mere mortal, Abignale's new Pan Am persona instantly bestows upon him a degree of fawning adulation and envy from the general public that we would only reserve today for significant celebrities, professional athletes and political dignitaries.

Fast forward to the present day and we find a much different picture. Where once pilots were seen as

the 'gatekeepers to the skies', skilled and adventurous symbols of exotic travel destinations and exciting lifestyles, today they're perceived more as 'bus drivers of the skies'; working long and inconvenient hours on regional routes and not exactly exuding the sort of career image that drives young job seekers to flight schools.

It's partly in response to this change in perception regarding pilots and their work that professionals and experts from the air transport sector met last year at ICAO's Next Generation Aviation Professionals or 'NGAP' Symposium. Their intention was to begin analyzing and addressing the looming air transport industry human resource shortages for pilots and maintenance workers that were first brought to light in the landmark IATA Training and Qualifications Initiative (ITQI) report back in 2009. As can be seen in the table in sidebar one, global pilot shortages projected in the IATA study are dramatic.

As the NGAP programmes and initiatives proceed on course, the *Journal* is continuing with its review of the 2010 event that charted the path now being pursued. The pilot- and flight crew-focused Symposium discussions featured a broad range of speakers and viewpoints.

IATA's Advancement of the MPL

Captain Dieter Harms, a Senior Consultant to IATA's Training and Qualifications Initiative (ITQI) and Leader of the NGAP Symposium Selection Criteria and Multi-Crew Pilot License (MPL) Implementation Working Group, reviewed IATA's priorities during the Pilots and Operations Panel (Panel 3) with respect to advancing greater global MPL acceptance and implementation. Harms reviewed the applicable regulatory challenges that lie ahead and detailed some of the strengths and unfortunate misconceptions that persist regarding the impetus and objectives related to competency-based MPL training approaches. For more on this

RESULTS FROM THE IATA TRAINING AND QUALIFICATIONS INITIATIVE (ITQI) 2009 REPORT		
Pilot and Training demand	**2018**	**2026**
Total pilots needed to fly new aircraft	193,100	350,200
New pilots for additional aircraft	135,000	224,500
New pilots needed to fill the fluctuation and retirement gap	72,600	125,400
Total new pilots (additional aircraft and fluctuation) needing ab-initio training	207,600	352,900
Total new pilots needing transition training on replacement aircraft	57,930	122,700

IATA ITQI Report, 2009, Section 4.1, pp.9–10

topic please review the sidebar on downgrading the importance of Single Engine Piston (SEP) aircraft training *(p.17)*.

Speaking more recently on the advances being made with the transition to MPL, Günther Matschnigg, IATA's Director of Operations and Infrastructure, stressed that the decision to support and move forward the MPL concept was more of a strategic, qualitative decision related to producing better, safer pilots, rather than quantitative decisions driven by the future shortages or more direct cost-benefit factors.

"Our early MPL objectives were based on two basic needs IATA had determined — to modernize training approaches based on the latest data and research and to work together with ICAO, the FAA and EASA to harmonize the regulations surrounding flight crew training requirements," Matschnigg continued. "When you consider that the end products of these training programmes, the flight crew personnel, need to be able to operate in varying aircraft and countries and for possibly a wide variety of operators during their careers, this need for regulatory harmonization across States and continents becomes clearly apparent."

Though some industry watchers began to doubt the 2009 ITQI projections on the heels of the global economic downturn, the recent $15 billion dollar order by India's IndiGo Airlines for 180 regional jets, the largest single order ever received by Airbus, reconfirms that air

transport will continue to grow at a significant rate and that IATA's projections still serve as a strong strategic indicator.

"This industry growth will be a fact moving forward and it highlights even more strongly the need for a globally-harmonized approach to pilot training," Matschnigg stressed. "So far, suitable regulations and courses have been adopted in 22 States and some 400 plus students will be graduating from MPL training over the coming year or so. We're working very hard in IATA to increase this level of acceptance and we will be spending and doing a great deal over the coming year especially to really push all related efforts forward. A competency-based approach to training flight crews with real, measurable skills, rather than simply enforcing airline compliance with minimum regulatory requirements for the granting and maintaining of pilot licenses, is what's really at the heart of all these efforts."

Important regional distinctions do still persist in some pilot training approaches, however. In the United States, for instance, there are over half a million certificated pilots and therefore a large pool of candidates for airlines to choose from when filling up their crew rosters. In Europe, meanwhile, where the accessibility of general aviation activities and infrastructure is far less prevalent, airlines have developed strict and specific *ab initio* programmes which,

Whereas most pilot training used to occur on small, straight wing, Single Engine Piston (SEP) aircraft, new insights gained during the research and transition to the new Multi-Crew Pilot License (MPL) approach over the past several years has meant that the student pilots of today and tomorrow will be much more likely to find greater emphasis, at the very early stages of their training, being placed on the technical, procedural and interpersonal behavioural domains that are now considered most relevant to multi-crew operations in commercial jet transport aircraft.

Though some had noted during the early stages of MPL transition that a reduction in basic SEP time and experience (evidence-based training) would result in a critical degradation of basic flying skills, these concerns ignore the fact that interpersonal skills, such as threat and error management (TEM), communication, leadership, teamwork, workload management, situational awareness, and structured decision making, are ultimately more important to the successful handling of system degradation or to the occurrence of an abnormal situation in a multi-crew environment.

Furthermore, whereas the 'stick and rudder' skills for flying a multi-crew airplane are completely different to those required to handle a SEP aircraft, they can only be acquired in type specific Flight Simulation Training Devices (FSTDs), or in the corresponding transport aircraft being trained for. It simply is not possible to train and develop these handling skills in SEP aircraft.

Additionally, MPL proponents have argued that, at high levels of stress, humans will tend to revert to the basics first learned for a specific task. This would then entail that basic training on SEP aircraft for an MPL environment is, beyond a certain level, counterproductive, if not unsafe, due to the fact that swept-wing jet aircraft have very different handling characteristics to those of SEP aircraft in most regimes, including a substantially greater speed range, and take-off, landing and pitch and power techniques.

As a result, newer approaches to pilot training today are relegating SEP time to a minimum, whereby the trainees are able to appreciate the feel of aerodynamic laws in the real environment while additionally gaining some preliminary insight into the use of aviation language, including Air Traffic Control (ATC) phraseology and the use of general procedures in aviation.

Triggering facts for the development of the MPL approach included the obvious divergence between the competencies required for the successful operation of modern, multi-crew jet transport aircraft and the regulatory requirements for training. The lack of training time with respect to manually controlling a jet aircraft in normal and abnormal situations was also a factor.

The MPL training scheme covers these items by defining detailed performance criteria for a) Flight Management, Guidance & Automation and b) Manual Airplane Control. Compared to current *ab initio* SEP training schemes, a standard MPL training course provides four times more instruction time in the jet-based, multi-crew environment, thus producing a better prepared co-pilot.

by virtue of their pre-screening and intensive, jet-focused approaches employing advanced simulators as well as smaller aircraft, are more in line with IATA's ideal of how best to develop future pilots on a globally-harmonized basis. Not every State has the land and infrastructure to offer GA training and activities at an affordable cost, but every State can provide training and simulation facilities for rigorously pre-screened trainees.

Lufthansa is one of the best in this regard, employing very strict pre-qualification criteria and rigorous training and testing methods which the airline itself subsidizes to the tune of approximately €750,000 per trainee. Once hired, the new pilot is then expected to reimburse 15 percent of that amount over a set period.

"IATA has begun to consider the development of a special and common training fund to help subsidize some of these pilot training activities," Matschnigg added. "This thinking is at a very preliminary stage but the idea is basically to reach out to airlines, States, aircraft manufacturers and other international finance and development stakeholders so that these expenses can be more evenly shared by all the sectors of industry and society that benefit from the multi-faceted prosperity that a safe and efficient air transport system serves to foster."

IFALPA and IAOPA Viewpoints

Also during the Panel 3 deliberations, Captain Georg Fongern, speaking on behalf of the International Federation of Airline Pilots' Associations (IFALPA), stressed strongly how better screening regimens could help flight crew training stakeholders maximize their resources. Among other points relating to outreach and recruitment priorities, Fongern added that more rigorous and effective screening, while additionally preventing financial losses to airlines and the students themselves, would ultimately enhance overall industry safety and produce flight crews and pilots who were more efficient and effective in the cockpit.

John Sheehan, Secretary General of the International Council of Aircraft Owner and Pilot Association (IAOPA, an official ICAO Observer since 1964), rounded out the Panel 3 viewpoints by

stressing the merits of General Aviation (GA) sector as it serves as a *de facto* training ground for pilots and maintenance personnel as they prepare for service in commercial operations and other professions. He questioned whether or not *ab initio* training by airlines, though effective at streamlining pilots for specific commercial fleet duties and responsibilities, was in the end as effective at providing the broad range of experience and confidence derived from longer hours spent in the service of GA-related operations.

Sheehan also highlighted how, importantly, pilot professionals are not only required for commercial jets but also for on-demand air charter services, corporate aviation, air ambulance and agricultural needs, and lastly flight instructors.

Flight Simulation Training Devices (FSTDs)

In the simulator-related presentations (Panel 7), Mark Dransfield spoke on behalf of himself and his absent colleague, Captain Jean-Michel Bigarré. The two were to have jointly represented simulator designer and manufacturer Mechtronix World Corporation (MWC). Dransfield's presentation summarized the safety challenges facing the industry as a whole as well as the economic factors impeding simulator ownership by individual airlines.

He stressed, however, how newly-emerging FFS Level D technology, the new MPL-focused pilot training environment and the new ICAO Doc 9625 regulations based on the work on FSTD training qualification standards produced by the Royal Aeronautical Society International Working Group, have all contributed to a new FSTD environment whereby airlines can now consider developing their own facilities for their own pilots and provide FSTD training on a much more cost-effective basis.

Capt. Gary Morrison, Global Head of MPL, *Ab initio* Initiatives and Regulatory Affairs

for CAE, provided an in-depth analysis of the reasons for and benefits of competency-based approaches to flight crew training. Morrison highlighted the need for a strong safety infrastructure at the State level composed of not only of *ab initio* MPL training approaches, but also well-implemented Safety Management Systems (SMS), Quality Assurance programmes and the application of Instructional Systems Design principles. He detailed one such programme recently implemented in Malaysia by CAE, in conjunction with Air Asia and the Malaysian CAA. Morrison also stressed the need for more global harmonization of flight crew training efforts and approaches.

Speaking on behalf of the NextGen programme, Mark Creasap and Rick Packard of Adacel summarized the social and technological changes that are evolving today's young learners into hands-on 'do-ers' that learn more via active gaming theory principles rather than more passive book-based traditional learning paradigms. They outlined the need for training need to drive technological development in the NextGen environment, as well as the ability of simulation-based approaches to engender a specific aviation-related thought process and reactions to stimuli in the new generation of digital learners.

Brian Hampson of the Royal Aeronautical Society lastly outlined the research and conclusions of his organization's Flight Simulation Group, which maintains a significant international footprint and keeps abreast of flight simulation requirements in both civil and military areas worldwide. Hampson focused much of his talk on the worrying trend whereby aircraft systems and avionics Original Equipment Manufacturers (OEMs) have started to charge for their data at much higher prices than previously. Between 1991 and 2006 these data costs have risen by 260 percent and Hampson characterized these increases as short-sighted price gouging being made at the expense of industry safety.

Hampson stressed the need for new solutions to this issue, such as an ICAO-driven international agreement that would mandate the availability of this data for training and safety purposes on a cost-effective basis as part of any aircraft manufacturer/OEM contractual agreement. Otherwise, he warned, narrowly-focused profit motives would continue to impede aggregate aircraft sales and global air transport safety levels.

OEM Perspectives

During Panel 8 (OEMs and Training), Francis Archambault, Director, Marketing and Product Policy, and Benoît Thubert, Advance Project Design Authority, spoke on behalf of Thales and outlined the close synergies at work between their company's avionics development and related simulator advances. After a lengthy review of recent Thales innovations aircraft-wide, the two noted how Thales has been one of two companies at the forefront of simulator design and production for 45 years with many industry firsts under its belt. They noted that new training approaches and technologies would see the average age of pilots dropping from 40–50 years to the 25–35 age range, and that the time required to train new commercial jet pilots should drop from three years to 18 months.

Also during Panel 8, Capt. Dominique Falque of aircraft manufacturer Avion de Transport Regional (ATR) reviewed the current training challenges from the perspective of smaller regional carriers. He outlined his organization's global training locations and priorities, drawing specific attention to the problem whereby regional pilots often leave smaller carriers for larger ones once they have reached certain levels of flight time (pilot poaching). Falque noted that this process is presently requiring smaller airlines to face increased pilot shortages and lower their entry-level pilot requirements and noted some of the solutions ATR was putting in place to help reduce this lowering of pilot qualifications. ∎

ICAO Dangerous Goods Training Programme

ICAO has launched an exclusive new Dangerous Goods (DG) Training Programme based on the recently revised *Dangerous Goods Training Manual* (Doc 9375). The Programme consists of this new manual and several courses which will assist States in complying with the broad principles governing the international transport of dangerous goods by air as outlined in Annex 18—*The Safe Transport of Dangerous Goods by Air* and detailed in the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284).

Main benefits of the ICAO DG Training Programme include:

- **Courses and materials are delivered by ICAO directly—no third parties.**
- **Programme is developed specifically for State Inspectors, but will benefit all personnel dealing with DGs.**
- **Participants receive an official ICAO certificate upon successful completion of a test.**
- **Courses are based on the ICAO *Technical Instructions*—the only legal source of regulations for the safe transport of dangerous goods by air.**
- **Courses are delivered by senior level DG personnel with extensive experience.**
- **On-site training is offered to maximize availability and minimize costs.**

The first course—*Using the Technical Instructions*—is a prerequisite/refresher course that reviews the *Technical Instructions* section by section employing real-life examples and scenarios. Potential students should be well-versed in aviation terminology. Familiarization with the transportation of dangerous goods by air is useful, but not mandatory. Montréal course dates for Using the Technical Instructions are now established but spaces are limited.

Applicable 2011 course dates*:

14-18 February	**25-29 July**
7-11 March	**12-16 September**
11-15 April	**24-28 October**
16-20 May	**21-25 November**

* With the exception of the February course in Brisbane, Australia, all courses will be held in Montréal, Canada. All dates and availability are subject to change.

Register today!

For more information contact:

Rick Lee
rlee@icao.int
+1-514-954-8219 ext. 7001

For additional details visit:

www.icao.int/anb/fls/dangerousgoods/training/

Montreal Convention of 1999 Reaches New Milestone

In January 2011 the number of parties to the Montreal Convention passed the 100 mark, with Israel becoming the 100th and Turkey the 101st party to the Convention.

The Convention, which entered into force on 4 November 2003, modernizes and consolidates the international regime of air carrier liability originally established under the Warsaw Convention of 1929.

The new treaty is now in force for States representing approximately 90 percent of international passenger traffic. Among the features of the Montreal Convention is a two-tier liability regime enabling recovery of proven damages without pre-specified liability limits for bodily injury or death sustained by a passenger. Where limits of liability still remain operative, as in the case of delay or baggage-related claims, a built-in economic adjustment clause preserves the economic value of the compensation over the passage of time. The first such adjustment took place in 2009.

It is generally considered that this Convention improves the compensation regime for victims and heirs and facilitates the resolution of claims.

The deposit by Israel of its instrument of accession to the Montreal Convention of 1999, during a brief ceremony at ICAO Headquarters on 19 January 2011. Shown on the occasion (from left to right) are: Yoram Elron, Representative of Israel to ICAO, Consul General of Israel in Montréal; and Denys Wibaux, Director, Legal Affairs and External Relations Bureau.

The deposit by Turkey of its instrument of ratification of the Montreal Convention of 1999 at ICAO Headquarters on 25 January 2011. Shown on the occasion (from left to right) are: Oya Tuzcuoğlu, Ambassador, Representative of Turkey to ICAO; and Denys Wibaux, Director, Legal Affairs and External Relations Bureau.

New ICAO Guidance Updates

The following Documents and Circulars are now or will soon be available for download in English by pertinent civil aviation stakeholders via their allocated ICAO.NET permissions. Other parties interested in reviewing these new or updated guidance materials may purchase them online at:

http://store1.icao.int/search.ch2

or by contacting **ICAO Customer Services Unit** at:

Tel: +1 (514) 954-8022
Fax: +1 (514) 954-6769
E-mail: sales@icao.int

Doc 9756	*Manual of Aircraft Accident and Incident Investigation,* Part III.
Doc 9337	*Manual of Operating Procedures and Practices for Regional Monitoring Agencies (RMAs) in relation to the use of a 300m (1,000ft) vertical separation minimum between FL290 and FL410 inclusive.*
Cir 324	*Guidelines for Lateral Separation of Aircraft on Published Adjacent Instrument Flight Procedures for Arrival and Departures.*
Cir 328	*Unmanned Aircraft Systems (UAS) Circular.*
Cir 330	*Civil/military Cooperation in Air Traffic Management.*

ACARE
The Advisory Council for Aeronautics Research in Europe

Advancing Aeronautics and Air Transport beyond Vision 2020, Europe's Pre-eminent Aviation Environment Research Body has Profoundly Shaped Europe's Advances in this Area for the Past Decade.

Aviation has dramatically transformed society over the past 100 years. The economic and social benefits throughout the world have been immense in 'shrinking the planet' with the efficient and rapid transportation of people and goods. The growth of air traffic over the past 50 years has been spectacular and will continue into the future, particularly in the growing markets of the Far East.

The European Air Transport sector, made up of civil aeronautics and air transport, generates a turnover in excess of Euro 94 billion and represents a pinnacle of manufacturing capability. It employs almost half a million highly-skilled people directly and cascades new technologies and improvements out to many other economic sectors. Approximately 2.6 million indirect jobs can be attributed to air transport-related activities and a contribution of close to Euro 240 billion to the aggregate European Gross Domestic Product (GDP).

The Advisory Council for Aeronautics Research in Europe (ACARE) brings together over 40 members representing the broad spectrum of stakeholders in the European air transport community. These include the aeronautics industry, airlines, airports, air traffic control service providers, the European Commission, Member States, research institutes and academia. ACARE's primary mission has been to establish and carry forward a Strategic Research Agenda (SRA) aimed at influencing all relevant stakeholders in the planning of research programmes in aeronautics and air transport at national, EU and even private-sector levels.

The ACARE SRA is not a research programme in and of itself, but rather a roadmap outlining the strategic orientations which should be taken if Europe is to meet society's needs for aviation as a public mode of transport, as well as related noise and emissions reduction requirements, all in a sustainable manner.

The European Commission established a High Level Group in December 2010 to produce a New Vision for Air Traffic Systems. The initiative is led by Vice President Siim Kallas and Commissioner Máire Geoghegan-Quinn. The members of the High Level Group comprise CEO's of stakeholder organizations representing aeronautics and air transport including airlines, airport operators, air traffic management providers, products manufacturers, fuel producers and research centres. The New Vision is expected to be released during the Aerodays event in Madrid in March/April 2011. In response to this New Vision a new Strategic Research Agenda will be elaborated by ACARE with the objective that it is ready by year-end, concurrently with the establishment of the 8th European Research Framework Programme.

ACARE's SRA provides strategic goals and Research & Technology (R&T) roadmaps for proposed solutions to achieve the objectives outlined in Vision 2020. The SRA goals have had a clear influence on current aeronautical research and there is strong evidence of a vigorous programme of aeronautics and air transport research. This programme is already delivering important initiatives and benefits for the aviation industry, including: more collaborative EU research in Aeronautics and Air Transport (EC's Framework Programme research); the Clean Sky Joint Technology Initiative; the SESAR Joint Undertaking; national programmes in many Member States; and lastly Research Establishment and private company programmes.

In the course of its research initiatives and other activities, the ACARE SRA has identified five major challenge areas:

- **Quality and Affordability —** The challenge of delivering to passenger, freight and other customers the increased quality, economy and performance they need.
- **The Environment —** The challenge of meeting continually-rising demand while reducing the environmental impacts of manufacturing, operating and maintaining aircraft.
- **The Efficiency of the Air Transport System —** Rising traffic should not exacerbate the downsides of congestion, delay and lost

opportunities. The efficiency of the whole system must be substantially improved, which will call for the introduction of radical new concepts.
- **Safety —** The challenges of convincing passengers and society at large that, notwithstanding greatly increased traffic, commercial aviation will not only remain extremely safe, but will manage to further reduce the risk of accident.
- **Security —** The challenge here is to devise measures that will improve security, on a global basis, within a highly diverse and complex system.

ACARE has questioned whether evolutionary changes will be sufficient to meet these challenges. Indeed, just as the demands of the 2020–2030 era will be different from those of today, the solutions will also

need to be different in nature, and not just in degree. This will require step changes in concepts using new technologies to create a future system that will be very different from the one we see today.

As an example, it is well known that new engine concepts such as open rotors could bring a step change in mission fuel burn. Potential saving of approximately 25 percent could be achieved versus the best present engines in a typical short-to-medium range mission — a category that represents about two-thirds of those performed by today's transport aircraft. Regarding external noise emissions, acoustic waves are not contained in a nacelle with open rotors and therefore the level of noise emission will not be as low as with turbofans of the same generation.

A strategy will have to be established to decide whether we want to work on long-term effects (typically CO_2 emissions) or on short-term concerns that satisfy the legitimate requests of neighbouring airport communities to reduce noise levels in their vicinity.

This strategic approach will require new experimental results, and a complex matching of engineering and physiological work. Significant effort will also be needed on trans-European

"The role of air transport has never been more important to society, and it is vital that our sector remains prepared to meet the challenges of a changing world."

synergies in the area of aeronautics research, in particular through the creation of new infrastructures aimed at facilitating collaborative efforts.

The current system of certification and qualification will need to be optimized in order to facilitate the rapid introduction of new and innovative technologies into production models.

Educational systems will also need to keep delivering a sustained flow of competent, trained and motivated people into our industry's research workforce.

Towards 2050: New Challenges Ahead

Since 2000, society's perception of air transport has changed due to the dramatic events of 9/11, a growing environmental awareness, the rise of oil prices and the recent financial crisis. Similar challenges for aviation are likely to continue into the foreseeable future.

Environment

Climate change is a major societal and political issue and is becoming more so with future emissions-related regulations. These are expected to become more prevalent in the near future than they are today.

Tough challenges lie ahead in this area. Globally, civil aviation emitted 666m tonnes of CO_2 into the atmosphere in 2008, representing some 2 percent of man-made CO_2 emissions. Non-CO_2 emissions, including oxides of nitrogen and condensation trails which may lead to the formation of cirrus clouds, also have impacts but require better scientific understanding.

In response to the likely volume of air transport activity in the future, aviation must bring about step changes in technology and operational procedures on top of the currently available solutions, so as to improve its environmental performance by keeping total climate effects at sustainable levels. Any reduction in absolute

emissions from air transport, however, will be difficult to accomplish and represents a major challenge.

Aviation is additionally and directly impacted by energy trends. As with other sectors, it is dependent on, and will have to deal with, energy availability in the coming decades to continue as an important development factor in future societies. Aviation will have to develop long-term strategies for energy supply — including alternative fuels — that will be technically suitable and commercially scalable as well as environmentally sustainable.

Reducing impacts around airports is also a challenge, given the need to ensure that noise levels and air quality in these areas remain acceptable. Environmental trade-offs, including those between emissions and noise, will have to be balanced to find optimized solutions for the air transport system and its sub-systems into the future.

An effective response in this regard would be to improve the environmental performance of aviation in the marketplace by redirecting resources generated through the aviation emissions trading scheme towards the development of R&T and deployment of the most efficient technological innovations. To this end, any aviation emissions trading schemes should be applied at a global level and prove their long-term economic and environmental viability.

A Changing World

The role of air transport has never been more important to society, and it is vital that our sector remains prepared to meet the challenges of a changing world.

With changing demographics and increased urbanization, society towards 2050 will need more long-range transport to connect markets and people. Passenger travel will increase with growth

in business and social-related mobility (dependent on the population being able to afford air travel). This continuing growth in demand will bring increased challenges for dealing with mass transportation and infrastructure congestion.

Global forecasts show a potential demand for some 25,000 new passenger and freight aircraft between 2008 and 2028, representing an order book value of Euro 3 trillion. This will be driven by the need for more fuel efficient and eco-efficient vehicles to handle additional capacity, as well as for the replacement of older generation aircraft. Important changes in infrastructure and operations will also be needed to accommodate the advances.

Financial Pressure

The world economy has been in a deep downturn. GDP growth rates in 2009 have been the lowest since the Second World War. However, there are good reasons to expect a recovery to normal growth rates of world GDP and air travel demand.

Aerospace is one of the most research-intensive sectors in Europe, and despite tough times, more than 12 percent of its turnover is dedicated to Research & Development. The scale of the challenge, however, is such that securing financing for vital new programmes and technologies will be a major issue for the future—especially as capital markets will in all likelihood remain tight in the medium-term.

Conclusion

In summary, the air transport sector must continuously innovate to remain globally competitive. Managing the evolution of the supply chain of the future will be a key success factor in this respect. There is also an additional and urgent need for a new commitment to global cooperation to help develop a strategy for clear 'win-win situations' in order for aviation to better serve the needs of society.

ACARE has thus far helped to demonstrate the clear strength of working together across the whole community of industry, research establishments, universities, governments, regulatory authorities, and the European Commission. The substantial results the sector has achieved since setting the 2020 Vision provides the foundation for preparing a new vision for aeronautics and air transport beyond 2020 and towards 2050. ■

Alain Garcia
Chairman, ACARE Integration Team

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Readers are also encouraged to visit the ACARE web site at: **www.acare4europe.org**

ACCRI
The Aviation Climate Change Research Initiative

Dr. Mohan Gupta is the Special Assistant to the Chief Scientist in the Federal Aviation Administration's Office of Environment and Energy. He provides technical and scientific expertise on the characterization, assessment and mitigation of aviation environmental impacts related to emissions and noise as well as on the ways to promote aviation fuel efficiency. In addition, he worked very closely with the United States Climate Change Research Program (USGCRP) and its participating federal agencies and established the FAA funded Aviation Climate Change Research Initiative (ACCRI) programme. Gupta has over 20 years of research experience in the area of atmospheric and climate science and is a member of Energy and Environment Working Group of The Aeronautics Science and Technology Subcommittee of the National Science and Technology Council (NSTC). He is also a member of Atmospheric Composition Interagency Working Group of the USGCRP and the Air Quality Research Subcommittee of NSTC on Environmental and Natural Resources (CENR). He has an extensive and diverse educational and professional background in physical and mathematical sciences.

Aviation is a pillar of the modern economy and a key driver of both supply and demand in global, national and local markets. It moves millions of people and billions of dollars worth of goods all around the world.

Today, approximately 23,000 aircraft operated by more than 2,000 airlines carry more than 2.2 billion passengers annually and serve about 3,750 airports throughout the world.[1] In 2007, in particular, the U.S. civil aviation sector contributed 12 million jobs, added 1.3 trillion dollars in total economic activity and represented 5.6 percent of the country's Gross Domestic Product (GDP).[2]

Similar to emissions produced during combustion of other fossil fuel sources, aircraft engines also emit carbon dioxide (CO_2), water vapour (H_2O), nitrogen oxides (NO_x), sulfur oxides (SO_x), hydrocarbons (HC), and black carbon (or soot) particles. The largest fraction of these emissions takes place in the

flight corridors throughout the upper troposphere and lower stratosphere (between 8–13km or 26,000 – 40,000ft).

Reactive aircraft emissions progressively mix and interact with the surrounding air and perturb atmospheric chemical composition—potentially contributing to climate change. Aviation climate impacts are due to CO_2 and non-CO_2 emissions. The sector's CO_2, H_2O and soot emissions *directly* absorb solar and terrestrial radiation and therefore contribute to climate change with positive radiative forcing.

Emissions of NO_x, SO_x, H_2O and black carbon aerosols, on the other hand, represent *indirect* aviation contributions to climate change. For example, NO_x emissions contribute to enhanced photochemical production and loss of tropospheric ozone and methane—both of which are greenhouse gases. In addition, H_2O vapour emissions trigger the formation of contrails in sufficiently cold air masses. These may persist for hours and can potentially increase cirrus cloudiness in ice-saturated air masses. Furthermore, direct emissions of black carbon and *in situ* formed aerosols serve as cloud condensation nuclei which, along with background aerosols, facilitate the formation of contrails and cirrus clouds.

Contrails and induced cirrus clouds reflect solar short-wave radiation and trap outgoing long-wave radiation resulting in the net positive contribution to the climate change.

Readers are referred to ACCRI (Aviation Climate Change Research Initiative) publications for details on aviation emissions and governing processes that control their climate impacts.[3] Figure 1 displays a schematic of aircraft emissions and their resulting potential impacts on climate change and social welfare.

Aviation is a small but an important contributor to climate change. At present, aviation accounts for about 2 percent of global CO_2 emissions and about 12 percent of the CO_2 emissions from all transportation sources.[4]

Figure 1: Schematic representation of aircraft emissions and their causal linkages, including potential climate and social welfare impacts. Note that both the level of scientific uncertainties and policy relevance increase from characterization of emissions to social damage attributions (adapted from Wuebbles *et al.,* 2007).[5]
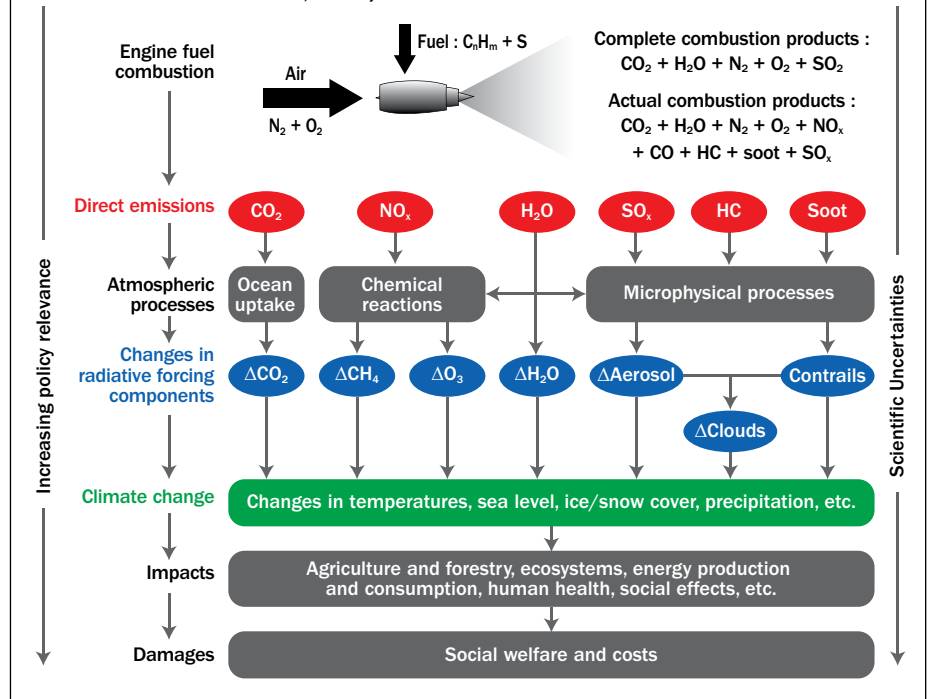
It is important to note that climate impacts of aviation CO_2 emissions are not different from those due to other CO_2 source emissions. Climate impacts of CO_2 emissions are well characterized and are independent of source location due to their relatively long atmospheric life time. On the other hand, non-CO_2 climate impacts of aviation emissions are quite variable in space and time. The duration of their associated atmospheric changes ranges from minutes (for contrails) to years (for changes in methane).

Radiative forcing (RF), a global measure of instantaneous energy imbalance per unit area at the tropopause, is widely used as a proxy for climate change and applies well to well-mixed and long-lived greenhouse gases. There are, however, continuing potential issues with applying it in order to relate climate forcing to climate response for in homogenously mixed, short-lived forcing agents which have strong regional climate fingerprints.[5]

"Lee et al." (2009)[6] estimated ~55mWm^{-2} (23-87 mWm^{-2}, 90 percent likelihood range) as aviation's total RF in 2005. They raised this estimate to ~78mWm^{-2} (38-139 mWm^{-2}, 90 percent likelihood range) after including contributions from aviation-induced cirrus resulting in a total aviation contribution of ~4.9 percent to the overall global anthropogenic forcing.

Aircraft emissions are expected to increase with the projected growth in aviation and this will likely result in enhanced climate impacts, both in absolute magnitude and in relative terms, unless effective mitigation actions are implemented. It is important to note that aviation non-CO_2 RF in 2005 is equal to or exceeds that of aviation CO_2 emissions alone. This means that a reduction in future aviation CO_2 emissions will limit merely half of the aviation climate impacts. It is equally important, therefore, to improve uncertainties in aviation non-CO_2 climate impacts which have the potential to be more local and regional in

nature, while taking appropriate measures for absolute reduction in non-CO_2 emissions and related climate impacts.

Significant scientific advances have been made over the last decade to better characterize aviation climate impacts. The level of scientific understanding, however, particularly regarding the quantification of contrails and induced cirrus clouds climate impacts, remains unchanged and ranges between low and very low respectively.[7,8] In fact, the Fourth Report of the Intergovernmental Panel on Climate Change (IPCC)[8] did not even attempt to quantify the climate forcing associated with aviation induced cirrus clouds. FAA/NASA (2006)[9] and ICAO/CAEP (2007)[10] workshop reports also made similar conclusions about the understanding and uncertainties specific to aviation non-CO_2 climate impacts.

The United States is developing and implementing the dynamic, flexible and scalable Next Generation Air Transportation System (NextGen) to meet future aviation mobility demand.[11] The Environmental Working Group (EWG) of the U.S. NextGen Joint Planning and Development Office (JPDO) is responsible for the development of strategies to ensure that the full potential of NextGen can be realized in an environmentally unconstrained manner. A similar initiative under the SESAR (Single European Sky ATM Research[12]) programme is being implemented in Europe to reform the architecture of the continent's Air Traffic Management (ATM) system and to increase overall capacity and efficiency.

Of all the environmental challenges facing civil aviation stakeholders, including noise and emissions, the sector's aggregate climate impact remains by far the most contentious concern.[13] A number of domestic and international climate-related policy actions are presently being considered that may profoundly impact the global aviation sector, meaning that a well developed scientific basis for aviation climate impacts with reduced uncertainties is needed more urgently than ever to inform optimally balanced cost-beneficial actions while accounting for system wide environmental tradeoffs and interdependencies.

Under the auspices of the EWG/JPDO, the Federal Aviation Administration (FAA) has developed the Aviation Climate Change Research Initiative (ACCRI) with participation from the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA) and other federal agencies of the Unites States Global Change Research Program (USGCRP).

ACCRI is a practical-need driven research programme with an objective to identify and address key scientific gaps and uncertainties regarding aviation climate impacts, while at the same time providing timely scientific input to inform optimum mitigation actions and policies. The ACCRI approach seeks to support aviation-specific climate change research that is solution-focused and policy-relevant, as well as to coordinate and link its research needs and activities with related national and international climate change research efforts.

ACCRI is one of the components of the FAA's five-pillar plan to address NextGen Environmental and Energy (E&E) issues. The remaining pillars of the FAA plan include: improved scientific understanding and enhanced aviation environ-mental integrated modeling capability; accelerated maturation of new aircraft technologies through the CLEEN (Continuous Lower Energy, Emissions and Noise) programme; exploration and deployment of aviation alternative fuels, accelerated improvement in environmental efficiency of air traffic operations; and finally policies, environmental standards, market based measures and deployment of environmental management systems. This plan also supports the E&E goals of the National Aeronautics Research and Development Plan.[14]

ACCRI's programme is guided by a sequential four-step process. Under Step I, ACCRI openly solicited and supported national and international science teams to develop subject-specific white papers dealing with all scientific aspects of the non-CO_2 climate impacts of aviation and related metrics. These whitepapers provide a review of the latest state of knowledge, uncertainties, analysis capabilities, and gaps, in addition to research recommendations. Under Step II, ACCRI convened an international workshop in 2008 which was attended by more than 90 experts from various disciplines. Scientific findings and the Way Forward are summarized in the workshop report which, along with all subject specific white papers, is available via the FAA Environment and Energy web site.[3] Extract findings from Step I and II activities were recently published in six peer-reviewed papers of the Bulletin of the American Meteorological Society.[15]

With guidance from the Step I and Step II findings, ACCRI implemented Step III and funded eight research projects through an open solicitation and competitive merit-based selection process. The FAA has formed the ACCRI Consortium by linking ACCRI- and PARTNER[16]-funded climate research projects.

Currently, the ACCRI Consortium consists of 10 research projects, 18 atmospheric and climate models, and 47 research experts from 25 national and international institutes. In the near future, the ACCRI Consortium will be expanded to include approximately 10 additional research teams which are independently funded by research institutions around the world. Several of the ACCRI Consortium members also participated in the European aviation climate change research programmes, such as TRADEOFF, QUANTIFY, ATTICA, etc.

ACCRI is therefore well-positioned to benefit from the latest progress and findings in this area.

The scope of the ACCRI Consortium spans a range of activities which include laboratory measurements, atmospheric

Figure 2: Schematic representation of the different research elements for an integrated assessment of the effects of aviation on climate. *(Adopted from the ACCRI Way Forward Report.[3])*
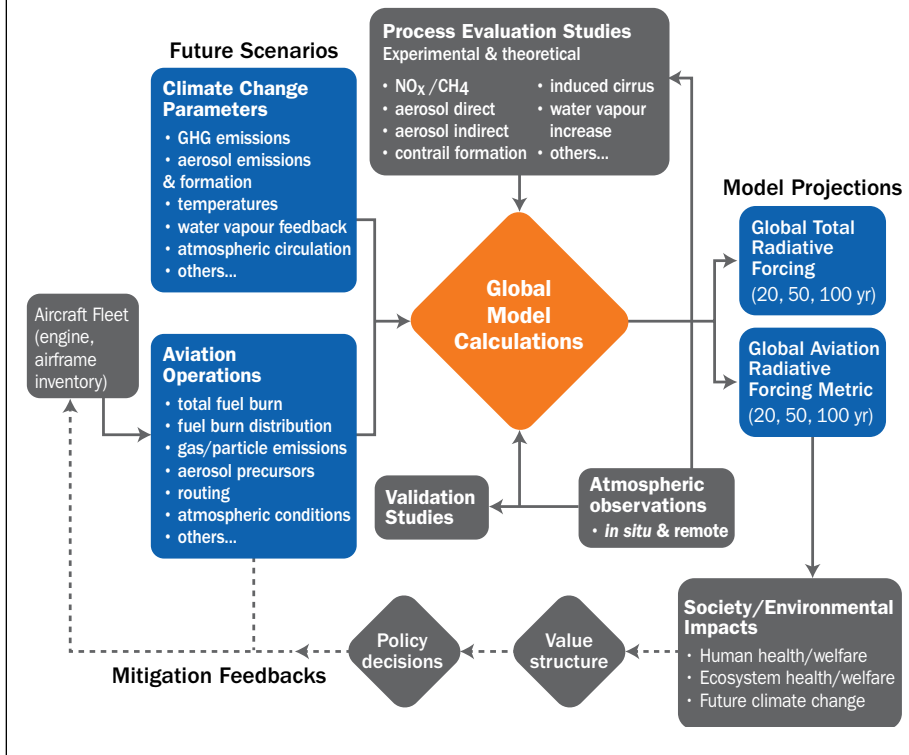
observation data analyses, simulations of atmospheric and climate impacts of aviation emissions using chemical transport and general circulation models, and model-data intercomparison analyses. Figure 2 displays a flow diagram illustrating the integrated assessment of aviation climate that is being pursed under the ACCRI programme.

The ACCRI Consortium is dedicated to:

- Quantifying the non-CO_2 climate impacts of aviation emissions on regional and global scales for the present (2006) and future (2050) atmosphere and aviation operations.
- Refining and better constraining uncertainty estimates.
- Accounting for feedback and interactions among aviation emissions and the changing background atmosphere.
- Examining the suitability of metrics employed to properly characterize and interrelate aviation climate impacts on relevant spatial and temporal scales.

The first phase of the ACCRI Step III activities will continue through 2011. ACCRI will convene annual science meetings to communicate its research findings among Consortium participants. Continuation of the ACCRI programme beyond 2011 will depend upon its productive and timely contribution to inform decision-making.

In summary, the FAA is actively pursuing research to better quantify aviation non-CO_2 climate impacts with a consortium of national and international scientists. Progressive ACCRI outcomes aim to contribute to and expand the scientific basis for the climate impacts of aviation. This scientific basis is needed to support the development and implementation of optimum and balanced mitigation solutions in the form of aircraft technologies, operational procedures, air traffic management systems, and alternative fuels, as well as consideration of environmental certification standards, policies, and market based measures.

An effective combination of these mitigation solutions will ultimately equip the international aviation community with the means to meet its mobility and sustainability goals while protecting the environment. ∎

[1] Based on the BACK Official Airline Guide aviation fleet/schedule/ancillary data; available online at www.oagaviation.com

[2] The Economic Impact of Civil Aviation on the U.S. Economy, Dec. 2009. (http://www.faa.gov/air_traffic/publications/media/FAA_Economic_Impact_Rpt_2009.pdf)

[3] Aviation Climate Change Research Initiative (ACCRI), http://www.faa.gov/about/office_org/headquarters_offices/aep/aviation_climate/

[4] ICAO Environmental Report 2007 (http://www.icao.int/env/pubs/env_report_07.pdf)

[5] Wuebbles, D. *et al.,* Evaluating the impacts of aviation on climate change, EOS Transactions, American Geophysical Union, Vol. 88, no. 14, 156-168, April 3, 2007.

[6] Lee, D. *et al.,* Aviation and global climate change in the 21st century, Atmospheric Environment, **43,** 3520-3537, 2009

[7] IPCC, 1999: Aviation and the Global Atmosphere, Cambridge Univ. Press, Cambridge, UK.

[8] IPCC, Climate Change 2007: The Physical Science Basis, Cambridge Univ. Press, Cambridge, UK.

[9] Workshop on the Impacts of Aviation on Climate Change: A Report of Findings and Recommendations, 2006 (http://web.mit.edu/aeroastro/partner/reports/climatewrksp-rpt-0806.pdf)

[10] Maurice, L.Q., Lee D.S. (eds) 2009, Assessing current scientific knowledge, uncertainties and gaps in quantifying climate change, noise and air quality aviation impacts, Maurice, L.Q., Lee, D.S., Wuebbles, D.W., Isaksen, I., Finegold, L. Vallet, M. and Spengler, J. Final report of the International Civil Aviation Organization (ICAO) Committee on Aviation and Environmental Protection (CAEP) Workshop, US Federal Aviation Administration and Manchester Metropolitan University, Washington DC and Manchester.

[11] Single European Sky ATM Research, SESAR (http://www.eurocontrol.int/sesar/public/subsite_homepage/homepage.html)

[13] Report to the US Congress, Aviation and the Environment, A National Vision Statement, Framework for Goals and Recommended Actions, 2004 (http://web.mit.edu/aeroastro/partner/reports/congrept_aviation_envirn.pdf)

[14] National Aeronautics Research and Development Plan, Feb. 2010 (http://www.whitehouse.gov/sites/default/files/microsites/ostp/aero-rdplan-2010.pdf)

[15] Bulletin of the American Meteorological Society, Volume 91, Issue 4, pp.461-496, April 2010 (http://journals.ametsoc.org/toc/bams/91/4).

[16] The Partnership for Air Transportation Noise and Emissions Reduction is a leading aviation cooperative research organization and an FAA/NASA/Transport Canada-sponsored centre of excellence.

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