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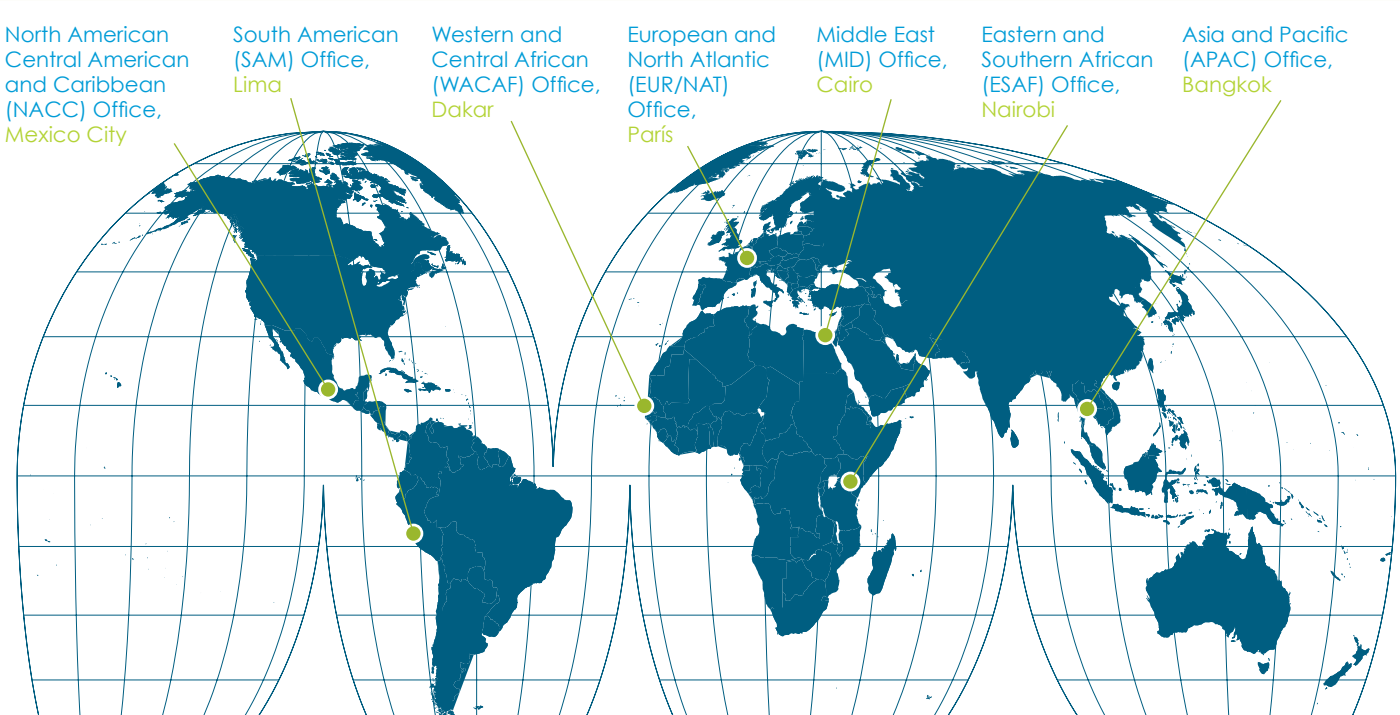

Leading on Aviation Sustainability

Today there is a much clearer recognition of the need to consider aviation's contribution to the three pillars of sustainability; economic, social and environment in a more integrated manner.

Despite our improved understanding of the dynamics of sustainability, the social pillar remains one area where aviation's contribution needs to be further enhanced and disseminated, see the articles on pages 18 and 21. In fact the preamble to the Chicago convention, the *'magna carta'* of international civil aviation, calls for the development of civil aviation to help create and preserve friendship and understanding among the nations and peoples of the world and to promote cooperation between nations and peoples upon which the peace of the world depends.

The sector directly employs six million people worldwide and supports millions more. Around 2.6 billion passengers travel by air each year, approximately 41 percent of goods by value are carried on passenger and cargo aircraft and the sector accounts for up to eight percent of world gross domestic product. Meanwhile CO_2 emissions from the sector accounts for two percent of global CO_2 emissions. The importance and magnitude of the economic benefits of air transport are further expanded in the articles on pages 12 and 15.

The democratization of air travel is one of the wonders of our time. Larger and more powerful aircraft fuelled the first great phase of widespread accessibility to air travel in the 1960s and 1970s. This was followed by political and deregulatory change in the '80s, and finally sophisticated air travel tools including computerized booking systems in the '90s.

The effect of this democratization of air transport has been its steadily increasing growth and importance to societies and economies, as well as the realization that, despite continuous improvements in its efficiency, much more will need to be done to address the environmental effects of increased air transport operations.

ICAO is accelerating developments and steadily progressing in a number of initiatives which have the potential to benefit international aviation's contribution across the three pillars of sustainability, focusing on four key areas:

1. State action plans/assistance to States.
2. Sustainable alternative fuels for aviation.
3. Market based measures.
4. Global aspirational goals.

This is in addition to the important technical work of the organization to enhance the environmental performance of aviation operations and to set Standards for the environmental certification of aircraft, including the development of an aviation CO_2 standard by 2013.

This year, ICAO provided extensive information, resources and capacity-building to assist States with the development of their aviation-related climate change action plans. Readers can find much more information on these activities in the article on page eight.

Sustainable fuels provide one of the most promising win win solutions for aviation's future. It addresses the three pillars of sustainable development, for example by reducing greenhouse gas emissions, improving local air quality and providing a new source of employment. In addition, alternative fuels can help to stabilize fuel price volatility, while providing a source of economic development in non-traditional fuel producing regions of the world. The Organization recently held an important Aviation and Sustainable Alternative Fuels (SUSTAF) workshop and a review of the event is provided on page ten.

A critical issue for the future is financing for climate initiatives. In order to achieve the global aspirational goals adopted at the last ICAO Assembly, the sector will require adequate financial resources to develop and implement a basket of mitigation measures on a global scale. We are aware of many proposals that focus on international aviation as a source of funding for climate related initiatives for the other sectors. We need to both balance the priorities we face and the measures to address them. Some of these issues are explored further on page nine.

In the lead-up to the Rio+20 conference next summer, UN Secretary-General Ban Ki-moon has launched a global dialogue on issues of sustainability and the future we want. In this special sustainability issue of the *Journal,* UN Under Secretary General Sha Zukang explains why the UN is bringing the world together in Rio to discuss and decide how to accelerate action for a healthier, more equitable and more prosperous world for all. See page six for his comments.

ICAO has a strategic role in facilitating coordination and co-operation among its Member States, the aviation industry and other stakeholders on various issues as they relate to international civil aviation. ICAO is ready to lead the sector through the sustainable development agenda and to ensure we guarantee the access to air transport for generations to come. Sustainability is your future and our responsibility. ■

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Rio+20 An Opportunity for Making a Difference

The United Nations Conference on Sustainable Development (Rio+20) will take place in Brazil from 20–22 June 2012. It marks the 20th anniversary of the 1992 United Nations Conference on Environment and Development and the 10th anniversary of the 2002 World Summit on Sustainable Development.

As Sha Zukang, Conference Secretary General reports, the objective at Rio+20 will be to secure renewed political commitment for sustainable development, assessing progress to date and remaining gaps in implementation, and addressing new and emerging challenges.

The Rio+20 Conference will focus on two themes: a green economy in the context of sustainable development and poverty eradication; and the institutional framework for sustainable development.

Rio+20 should be a Conference of implementation. It should generate economic dynamism and stability, promote social inclusion, create jobs, especially for youth, and protect the natural resource base on which the future of our planet depends. In short, it should integrate the economic, social and environmental pillars of sustainable development.

Secondly, it should lead to a more energized implementation of the sustainable development agenda. Thirdly, it should lead to coherent policies and programmes at all levels, making the three key concepts for Rio+20 integration, implementation and coherence.

To date, 15 regional meetings have been held or are planned on themes related to the Conference. All these preparatory meetings, including the PrepComs and inter-sessionals at the global level, have deepened understanding of the key issues involved; revealed different and diverse perspectives; heightened appreciation of the challenges; and helped formulate inputs for the compilation document.

Green Economy

A green economy can be a way to synergize growth and environmental protection by promoting win-win solutions and a way to include the poor as active participants/beneficiaries. It can be a means to accelerate progress towards sustainable development and poverty eradication and a way to re-orient public and private decision making so that it reflects and respects natural capital.

Member States have expressed both interest and concern over green economy. What has clearly emerged is that the pursuit of a green economy must take into account specific national circumstances and should be based on a set of guiding principles drawn from Rio 1992—including the principle of common but differentiated responsibilities.

In pursuing a green economy, ICAO can play a significant role. As I highlighted in my message to the ICAO Workshop on Aviation and Sustainable Alternative Fuels, organized in October 2011 as part of ICAO preparations for Rio+20, the development of an effective and efficient transport system is essential to secure sustainable development. The International Civil Aviation Organization is actively promoting the reduction of aviation environmental impacts through appropriate operational measures, Standards and market-based options. We appreciate the crucial contributions of ICAO to global sustainable air transport and to the UN's system-wide efforts in support of global sustainability.

There will also be growing interest at Rio+20 in the idea of sustainable development goals. These goals could help marshal political support and accelerate implementation. In this regard a tentative list of seven priority areas has been identified by stakeholders in preparatory meetings. These include: combating poverty; advancing food security and sustainable agriculture; sound water management; energy access including from renewable sources; sustainable cities; management of oceans; and improving resilience and disaster preparedness.

In addition, Member States and stakeholders have stressed cross-cutting issues, including climate change, sustainable consumption, means of implementation, gender mainstreaming, education, science and technology.

Institutional Framework for Sustainable Development

At the global level there is a clear expression of interest in strengthening the United Nations Environment Programme (UNEP). Within this broad expression, however, more detail is being sought on related implications. Along with ideas on strengthening the Commission on Sustainable Development and the Economic and Social Council, there is also a deep interest in the creation of a Sustainable Development Council. The model of the Human Rights Council is often cited.

At the regional level, ways to strengthen the Regional Commissions, and improve the interface with regional development banks, regional integration entities and other bodies is also a major preoccupation. At the national level, many are referring to the need to reorient national decision making, putting integration at the heart of the national system of ministries, and activating Sustainable Development Councils at national levels.

The UN system is being asked to strengthen its contribution at all levels. The 'delivering as one' modality has been cited as one good example.

Sustainable development offers a pathway that allows all of humanity to share a decent life on this, one planet. Rio+20 must be the turning point that makes that future possible. ■

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Encouraging Concrete Action on Climate Change

The 37th Session of the ICAO Assembly marked a turning point in ICAO's approach to addressing climate change from international aviation. Since the agreement by States of Resolution A37-19, ICAO has stayed active providing assistance to Member States with the development of their aviation-related climate change action plans.

The Organization is presently wrapping up a recent round of workshops in this regard and will continue to provide States with all necessary assistance for the preparation, submission and implementation of their action plans.

ICAO Assembly Resolution A37-19 established global aspirational goals for international aviation of two percent annual fuel efficiency improvement up to 2050. It also stabilized CO_2 emissions at 2020 levels—the first such shared global commitment by a sector.

A37-19 also marked a transition from policy to implementation when it urged States to voluntarily submit climate change action plans to ICAO, in addition to annual reports on international aviation CO_2 emissions. Under A37-19, States were invited:

> *"…to submit their plan to ICAO as soon as possible, preferably by the end of June 2012, in order that ICAO can compile the information in relation to achieving the global aspirational goals, and the action plans should include information on the basket of measures considered by States, reflecting their respective national capacities and circumstances, and information on any specific assistance needs."*

To ensure that States would be properly prepared to develop their action plans, the Resolution also requested the Council to provide guidance and other technical assistance for the preparation of States' action plans.

The Secretariat, with the support of the Committee on Aviation Environmental Protection (CAEP), accordingly developed the document: *Guidance Material for the Development of States' Action Plans,* as well as a framework for collecting, analyzing and reporting quantitative elements of the plans: aviation traffic (revenue tonne-kilometres); fuel consumption; and CO_2 emissions.

The action plan guidance document was endorsed by the CAEP Steering Group in September 2011. It serves as a generic aid for States, applying to all types of action plans ranging from simple compilations of data to elaborate reports. The guidance document consists of five parts, each focusing on a different aspect of an action plan:

Part 1: Introduction to Action Plans
Part 2: Estimation, Reporting and Verification of CO_2 Emissions
Part 3: Selection of Measures
Part 4: Analysis Methods and Tools
Part 5: Assistance Needs

Although not specifically mentioned above, additional issues integral to action plan development and common to Parts 3, 4 and 5 of the document were also included, such as financial needs, research activities, transfers of technology, capacity building (including education, training and public awareness), and information and networking.

ICAO also developed the Action Plan Emissions Reduction (APER) website, an interactive Web template for the submission of action plans that provides materials to assist with their preparation. The APER site also displays presentations provided by States on the action plan measures they're taking.

To maximize the usefulness and uptake of these guidance and resource initiatives, ICAO organized five regional action plan training workshops in Mexico City, Bangkok, Dubai, Nairobi, and Paris between May and July 2011. These provided interactive sessions on how to plan, prepare, and submit an action plan, with some participants taking advantage of the occasion to begin to develop or even present preliminary action plans to the other participants. Feedback on the ICAO guidance document and APER site was also encouraged.

A final action plan workshop was held in November 2011 in Montreal. ICAO encouraged States that have made progress in the development and implementation of their plans to showcase their activities and share their experiences with other States at this event. ■

A Sustainable Aviation Emissions Strategy

ICAO has a long history of developing policies, guidance materials and technical and economic studies on various options for Market-based Measures (MBMs), including emissions trading, emission-related charges and taxes, and carbon offsetting.

The 35th ICAO Assembly endorsed the development of an open emissions trading system for aviation and requested new guidance for use by States to incorporate aviation-sourced emissions into their trading systems. This guidance was developed by identifying options and recommendations on various elements of a trading system, including accountable entities, types of trading systems, allowance distribution, monitoring and reporting, and geographic scope.

While the guidance reflected the agreement of Member States in most elements of a trading scheme, there remained divergent views on the subject of geographical scope. This reflected an outcome from the 36th Assembly, urging States not to implement an emissions trading system on other States' aircraft operators, except on the basis of mutual agreement.

The 36th Assembly also agreed to establish a high-level group to continue to bridge the different views among States on MBMs. It reviewed a wide variety of MBMs and acknowledged that there remained disagreement on their application internationally. The group therefore recommended the development of *"a framework for MBMs in international aviation",* which was endorsed by an ICAO High-level Meeting in October 2009. The main objective was to avoid a patchwork of multiple or duplicated MBM initiatives and to encourage a global approach to address emissions from international aviation.

In line with these objectives, the 37th Assembly in 2010 agreed on 15 guiding principles for the design and implementation of MBMs for international aviation in Resolution A37-19. One of the principles was that *"MBMs should not be duplicative and international aviation CO_2 emissions should be accounted for only once".* The Assembly also resolved on a *de minimis* provision for the application of MBMs to ensure that States with small contributions to global air traffic are not burdened disproportionately.

The 37th Assembly also requested the Council to further develop a framework based on an elaboration of the guiding principles and to explore a global scheme for international aviation, a process which is now in progress. In this regard, the G20 Summit in November 2011 considered a report prepared by the World Bank and IMF. This report builds upon the work of last year's UN Secretary-General's High-level Advisory Group on Climate Change Financing (AGF).

Specifically, the World Bank/IMF report explores a globally coordinated carbon charge of $25 per tonne of CO_2 on international aviation and maritime (bunker) fuels, which it suggests could raise $40 billion per year by 2020 ($12 billion from international aviation). This measure is expected to reduce CO_2 emissions from each sector by five percent, mainly by reducing demand.

Although there are legal and practical implications regarding provisions of the Chicago Convention and related ICAO policies, as well as more than 4,000 existing bilateral air service agreements between States, the report does not give thorough assessment on these aspects nor explore in more detail the feasibility of implementing such a scheme. It also does not cover the full consequences of the proposal, which could be significant given the important role that aviation plays bolstering economic and social development through increased mobility and trade.

It should be noted that global aspirational goals for the international aviation sector, already agreed and adopted by the Assembly, will require appropriate financial commitments within the sector itself to respond to the global climate change challenge. It is of utmost importance that the design and implementation of any MBMs applicable to international aviation be treated as an element of ICAO's comprehensive mitigation strategy to achieve the global aspirational goals as part of a worldwide strategy for the sustainable future of international aviation—not in isolation.

Discussions on climate change need to strike a good balance among the three pillars of social, economic and environmental sustainability which, once applied to the international aviation sector, will allow this sector to grow in an environmentally sustainable manner and, at the same time, continue to ensure freedom to travel, access to mobility, poverty eradication and the exchange of cultural and educational experiences.

With a clearer roadmap in place governing the structure and development of global solutions on international aviation and climate change by the end of 2012, ICAO member States should be ready to agree on practical and effective climate change mitigation strategies by the next ICAO Assembly. ■

The Promise and Practicality of Aviation Biofuels

Broad and concerted international action is required to translate the potential that alternative fuels promise into a practical and sustainable reality for aviation.

In order to assist in the development of the international frameworks supporting this progress, as well as to expand the knowledge of ICAO's Member States of where the latest research and development into viable biofuels for aviation now stands, ICAO convened the Workshop on Aviation and Sustainable Alternative Fuels (SUSTAF 2011) in late October 2011.

The October 2011 ICAO SUSTAF Workshop made important contributions to the advancement of a globally harmonized approach toward sustainable aviation biofuels development. It marked a significant step in preparation for Rio+20 and its outcomes will feature prominently in ICAO's contribution to this worldwide sustainability conference.

SUSTAF was attended by more than 200 participants from States, international organizations, the aviation industry, fuel producers, financial institutions and academia. It highlighted the impressive progress made in this area in just the last three years, with some 300 alternative fuel initiatives currently underway, commercial flights now using biofuels from different feedstocks and a substantial increase around the world in the number of international consortia working on biofuels development.

State participants were able to voice their need for a more structured support mechanism to help develop policies in this area, improve their understanding of the role of biofuels in fuel price stability, express concerns about competition with food sources and begin fostering the high-level cooperation on a State-to-State basis that will help drive more cost-effective progress on biofuels. It also recognized the important role of sustainable alternative fuels as part of the measures available to States for inclusion in their action plans to reduce CO_2 emissions.

With the July 2011 approval of ASTM D7566, aviation fuels produced from hydroprocessed esters and fatty acids (HEFA) and derived from feedstocks such as camelina, jatropha, algae, and cooking oil waste, are now permitted for use on commercial flights.

The challenge ahead is to be able to affordably scale-up biofuels production utilizing sustainable biomass sources and conversion methods. SUSTAF addressed these and many other issues for States, promoting a common vision of making international aviation a sustainable means of transportation. It fulfilled ICAO's objective of stimulating a dynamic exchange of views and significantly enhanced ongoing dialogues amongst States, financial institutions, fuel producers and operators on the role of sustainable alternative fuels for aviation and the environmentally sustainable development of the sector.

With the rapid development of alternative fuels, States have expressed their need for guidance and support. In response, ICAO is forming a multidisciplinary group that will include experts from around the world to address key topics on sustainable alternative aviation fuels. It is envisaged that the initial focus areas for the group will be: legal/regulatory frameworks; sustainability criteria, emissions accounting; and financing. Fully acknowledging that these issues extend beyond aviation alone, the group will help to ensure that aviation-specific issues are well understood within the broader context. ■

ICAO Review: Sustainable Alternative Fuels for Aviation

This compilation of presentations of the ICAO Aviation and sustainable Alternative Fuels Workshop is available on the ICAO website at **www.icao.int/environmental-protection/**

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Aviation and Sustainable Development:

The Bigger Picture

Commercial air transport today sustains the international links that make the 'global village' possible, connecting over 220 countries with scheduled services. More than 36,000 airport pairs have non-stop services and recent work by the World Bank has found that 80 percent of the world's cities, large and small, could reach each other with at most two connections.

As Brian Pearce, Chief Economist for the International Air Transport Association (IATA) writes, aviation's role remains crucial to all aspects of social and economic progress and, on the environmental front, ICAO-agreed emissions targets have widespread support among all aviation stakeholders.

With States helping to support infrastructure improvements, industry should be able to achieve ICAO's two percent annual fuel efficiency improvement. Pearce stresses, however, that the air transport community needs to continue to promote and comprehend the implications of the factors affecting all of the sustainability pillars—environmental, social and economic.

In 2011, IATA estimates that there will be 2.8 billion enplanements representing some 1.2 billion separate passenger journeys. Airlines may carry less than 50 million tonnes of cargo by weight this year, but that's over one-third of world trade by value.

Modern businesses with overseas markets and globalized supply chains would not be able to function efficiently, let alone develop, without this air connectivity, as the world saw when a volcanic ash cloud closed much of Europe's airspace for a week in 2010.

Commercial aviation is young compared to most industries. Back in 1950 there were just over 30 million passenger departures. Today the market is almost 80 times as large. Travel distances have grown such that Revenue Passenger-Kilometres (RPKs) flown are over 160 times as large today as in 1950. Freight Tonne Kilometres (FTKs) flown are over 200 times as large. During this period the world's economies, i.e. other industries, expanded by nine times. Clearly commercial aviation has added tremendous value to the passengers and shippers that have used it but how does this many-fold expansion in air transport impact sustainable development?

Sustainable Development's Complex Components

Answering that question requires an understanding of what is meant by sustainable development and that is not easy. Defining sustainable development is a little like defining happiness or wellbeing. We know what it is but we struggle to pin down ways of measuring it. There are many alternatives.

At the corporate level the 'triple bottom line' of Profits, People and Planet is popular. The best known is from the UN Brundtland Commission's report which decided it means the capacity to "…meet the needs of the present without compromising the ability of future generations to meet their own needs." Economists have tried to operationalize this by defining sustainable development as something that, at least, sustains the various stocks of capital required to generate flows of income and other benefits that make up 'development'.

Of course, development itself is also a slippery concept. Gross Domestic Product or GDP measures the flow of income, but as we know welfare or wellbeing is not just about money. Nor is it that easy to identify and quantify the various ways in which an activity like commercial aviation supports the flow of GDP and other factors influencing wellbeing.

Air Transport's Role

It is clear that air transport plays a major role in supporting poverty reduction and economic, as well as social, development. There are several perspectives to take on the industry's contribution to more aggregated notions of development.

The most crucial is air transport's role in connecting countries and economies to overseas markets. The network of connections between cities represent an infrastructure asset as essential to the operations of modern economies as a well-educated workforce, investment in information and communications technologies (ICT), and the stock of capital equipment. This network enables a flow of tourists and trade, but also flows of skilled labour, ideas, capital and competition. Good air transport connections underpin and enhance the productive capacity of an economy, supporting long-term economic growth and development.

Much of the recent reduction in the number of people living below the poverty line was achieved in Asia and was largely a result of economies opening up and getting connected to the developed world. Globalization has its costs, admittedly, but the tremendous expansion in world trade is established as key in the reduction of poverty in terms of incomes.

Air transport has been a vital enabler, as well as beneficiary, of that globalization. Over the past forty years, international trade has expanded eleven-fold, matched by a ten-fold rise in RPKs flown and a fourteen-fold rise in FTKs flown. The 60 percent fall in the real cost of air transport over this period, driven by advances in aircraft technology and in airline operational efficiency, has been an important driver in the expansion of international trade. Through this mechanism low income countries have seen their economies expand and poverty reduced significantly.

The air transport network is also a key enabler for Foreign Direct Investment. Moreover, the industry plays an important role in technology development. Fuel technologies are being supported by, for example, U.S. industry and government investment in sustainable aviation biofuels. These will have spillover benefits as new energy sources for other sectors. Lightweight materials for airframes and engines are another area where R&D in aerospace has produced significant spillover benefits for other sectors, enabling more efficient and less energy-intensive surface transport.

Finally, there are the demand-side economic benefits supported by the jobs created in the aviation industry's supply chain and the multiplier effects these have through economies. Oxford Economics produced a quantified account of these demand-side, and case studies of the supply-side economic and social benefits in their *Aviation—The Real World Wide Web* publication. Some 33 million jobs worldwide were found to be supported by the industry. Oxford are currently producing over 50 country studies for IATA, covering over 80 percent of the industry, to help governments better appreciate the importance of good air transport connections to support economic growth and development.

Environmental Social and Economic Pillars

But how sustainable is this development? Sustainability is another of those slippery concepts. Economists have tried to operationalize sustainability in terms of maintaining capital stocks such as physical capital, human capital, social capital and natural capital. But that does not always help identify what is sustainable and what is not. Every economic activity damages natural capital in some way. Much of economic development to date has taken place by investments in physical and human (in terms of knowledge) capital being substituted for degradation in natural capital. But there is much controversy about how much substitution can take place and the extent to which some natural or other capital stocks are 'critical', in other words where damage is irreversible.

A properly functioning climate is one of those natural capital assets thought to be critical.

If trade-offs or substitution between capitals are accepted as possible, then it becomes difficult to operationalize sustainability at the level of the individual, company or industry. The economy as a whole needs to be on a sustainable development path, so it makes economic sense for some economic activities to be undertaken even though they degrade some capital stocks as long as others are investing in them—if that is the path of least resource use.

IATA commissioned McKinsey & Company to estimate the cost of reducing CO_2 emissions in the airline industry. It was shown that—because high fuel costs already drive efficient

Creating and maintaining sustainable livelihoods is just one of the key contributions of air transport to social capital. Air connectivity opens connections with new markets and new partners. This is as important to the efficiency of modern developed economies as it is to low income countries.

energy use—air transport is one of the most costly and resource intensive sectors within which to reduce emissions. An economist would point out that the world would use fewer resources to hit its climate stabilization target by investing in emission reduction outside the commercial aviation industry.

However, the aviation industry has recognized its obligation to be part of the solution to the climate change problem, even if the economics show this to be a costly option for the world. Sustainable biofuels and lightweight materials have already been discussed as two positive contributions. The industry has also taken on several targets to control and reduce its climate impacts: to achieve fuel efficiency gains of 1.5 percent a year until 2020, after which the industry would keep to carbon neutral growth, aiming at a long term target reduction of net CO_2 emission by 2050 to 50 percent of 2005 levels.

These targets have widespread support among the airlines, airports, air navigation providers and manufacturers. With governments helping to provide infrastructure improvements, the industry should be able to achieve ICAO's two percent annual fuel efficiency improvement target.

Air transport's other significant impacts on natural capital (noise around airports and local air quality) are not irreversible nor are they critical natural capital assets. Nonetheless, they have significant impacts on local communities—affecting social capital—and airlines, airports, air navigation providers and manufacturers have made substantial investments to reduce these impacts.

Both local emissions and the noise footprint of modern aircraft are very much smaller than in the past, although total impacts vary from location to location depending on the pace of expansion. There is also a complex interaction between the local environmental impacts and local livelihoods. Many people locate close to airports because of the jobs and livelihoods generated. Houses can be insulated against noise. Often local air quality is affected more by surface transport providing access to the airport than by the aircraft taking-off and landing. ICAO's balanced approach recognizes the need for a careful response to noise and air quality issues in order to achieve sustainable local development.

Creating and maintaining sustainable livelihoods is just one of the key contributions of air transport to social capital. Air connectivity opens connections with new markets and new partners. This is as important to the efficiency of modern developed economies as it is to low income countries. Modern high productivity industries, such as business services, banking and media, all depend on face-to-face meetings and the intensive use and need for broad and deep air transport connections.

Security is also critical to social capital, as terrorism can undermine the social fabric. Airlines have been making substantial investments and working closely with governments in order to minimize the risk of further security incidents, including the development of a 'checkpoint of the future' aimed at delivering secure travel with minimal hassle.

Sustainability is also about financial sustainability. Economists would take this to mean that a company or industry would need to be value creating for its customers and its supply chain, and could capture enough of that value to pay its shareholder a return comparable with what they could earn elsewhere at similar risk.

The tremendous growth of air transport since the 1950s is testimony to the value created for consumers. Its intimate role in enabling globalization, and the experiences gained during the European airspace closure in 2010, shows that much value is also created for the wider economy. There have been environmental costs to that growth but there are active efforts being undertaken to minimize and reduce climate change and other impacts now that those are more clearly understood.

Many air transport technology developments have positive spillovers for other sectors. These wider economic benefits are not paid for by the governments and others that receive this value. They are positive 'externalities'. But shareholders have seen their capital invested in the air transport industry eroded at a rate of around $18 billion a year over the last full business cycle. With 75 percent of the airline industry now in private hands, the exceptionally low return on invested capital in operators presently looks unsustainable.

Addressing this essential aspect of aviation's economic pillar is perhaps the forgotten element to aviation's role in the more comprehensive advancement of global sustainable development. ■

Aviation, Sustainability and a Greener Economy

Transport sector industries will have a major role in driving greener growth and are critical to all three dimensions of sustainability.

In this special submission for the *ICAO Journal*, the International Transport Forum (ITF) highlights the many issues involved and points out that the difficulties of finding agreement on emissions trading systems, European or global, raises the question of whether negotiating a non-discriminatory fuel excise tax regime at a non-zero level, to internalize CO_2 emissions, might actually be an uncomplicated task that could result in a more robust market-based instrument.

Aviation emissions account for around two percent of CO_2 emissions from fuel combustion[1] and around 12 percent of transport sector CO_2 emissions today (Table 1). While we expect the share to remain around this proportion in the future (ITF 2010), the volume of aviation emissions in 2050 could be as large as today's emissions from cars (Figure 1).

At the same time, the growing thirst for biofuels for road and air transport is having an impact on farming and natural ecosystems across the world.

Figure 2 *(Page 16, top).* examines the potential of policies to drive more rapid fuel economy improvements in cars, mainly fuel economy and CO_2 emissions regulations for new vehicles. These set ambitious targets over a predictable long term path and generally feature tax incentives to assist the uptake of fuel efficient vehicles.

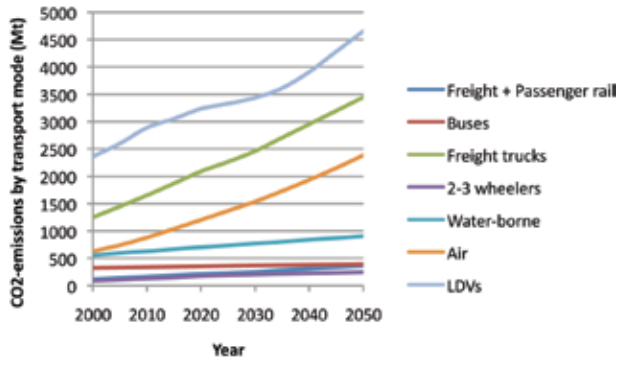
The penetration of electric vehicles is expected to be marginal in this scenario and the bulk of mitigation achieved through maximizing the uptake of improvements in internal combustion engines—identified technologies whose costs can be covered by the value of fuel savings given a regulatory framework that reduces the risks of rapid investment in new engine plants. The effect would be stabilization of emissions from cars near their current level[2] and around the baseline level projected for total aviation emissions in 2050.

TABLE 1: MODAL COMPOSITION OF GLOBAL CO_2 EMISSIONS FROM TRANSPORT VEHICLE USE (%)

	2000	2030	2050
Freight + Passenger rail	2.3	1.9	1.5
Buses	6.3	4.3	3.0
Air	12.4	13.8	12.0
Freight trucks	23.5	23.3	21.6
LDVs	42.5	45.2	52.1
2-3 wheelers	2.4	2.2	2.0
Water-borne	10.6	9.2	7.8
Total	100	100	100

Note: International Transport Forum calculations using IEA, MoMo version 2011. Source: ITF 2011.

Figure 1: Global CO_2 Emissions by Transport Mode, Reference Scenario, 2000-2050

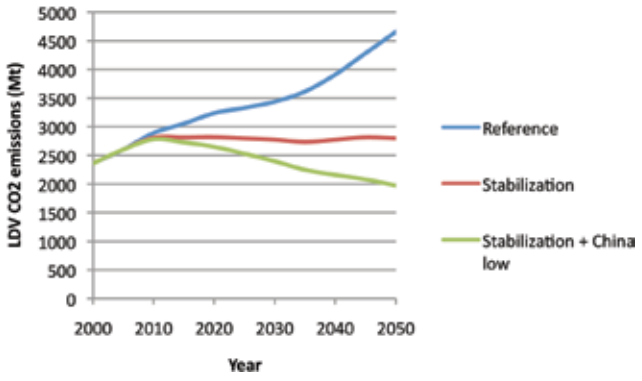


Source: ITF Transport Outlook 2010.

Fuel Efficiency

Oil prices are the key driver of fuel economy in aviation. The scenarios presented above are based on the International Energy Agency's assumptions of gradually rising prices in real terms from current levels of around $100 a barrel. Oil prices have yet to reflect our current economic uncertainty but are increasingly vulnerable to sharp fluctuations and not immune to large falls. Oil price expectations will determine the weight given to fuel economy in aircraft purchase decisions and this is important when considering potential policy intervention to mitigate emissions. Oil price volatility complicates decisions, blunting the full steering effect of high prices.

Figure 2: Global CO_2 Emissions from Light-duty Vehicles with Better Fuel Economy



Source: ITF Transport Outlook 2010.

The 2008 global aircraft fleet was 50 percent more efficient than the fleet in 1960, weighted for aircraft shares and travel volume (ICCT 2009). Fleet-wide efficiency has improved 1.5 percent per year on average since 1960 but the rate of improvement has decreased in recent years. Fuel costs accounted for only 20–30 percent of airline operating costs during much of the 1990s, second to labour costs for most carriers. High oil prices pushed this share to as high as 60 percent in 2008, putting extreme pressure on operators and leading some to retire older and less efficient aircraft.

Orders for more fuel efficient aircraft in 2010 and 2011, as airlines recovered from the crisis, as yet represent only a very small proportion of the total fleet. But the Airbus A380 and Boeing B-787 emit roughly 15 percent less CO_2 per seat kilometre than the aircraft they are designed to replace, signalling the renewed priority in aircraft design for fuel efficiency.

CO_2 Emissions Targets for Transport and Aviation?

Targets, either voluntary or compulsory, can be effective in focusing mitigation efforts. The key to effective target setting is combining long-term ambition with short-term practicality. This has been addressed in the difficult area of road safety by combining a long-term vision of zero deaths and serious injuries (Vision Zero, first adopted in Sweden) with shorter-term targets for progressive improvement based on the expected outcomes of measures actually introduced and investments made.

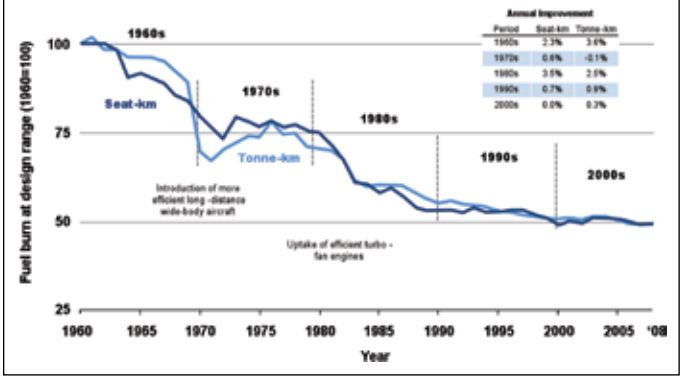
For passenger cars, U.S. and E.U. regulators have also taken a twin target approach, with short term binding standards rolled forward along a path set by longer term indicative targets.

ICAO's targets (ICAO 2010) include a global annual average fuel efficiency improvement of two percent until 2020 and an aspirational goal to continue improvement at this rate to 2050, on the basis of fuel used per revenue tonne kilometre. ICAO's Assembly has also resolved to keep global net carbon emissions from international aviation from 2020 at their 2020 level.

Industry has agreed ambitious collective targets for carbon neutral growth from 2020 and a 50 percent cut in emissions by 2050 relative to 2005 levels (IATA 2009). This strategy covers all of the relevant dimensions: improved technology, more efficient operations and infrastructure and alternative fuels. IATA is also asking governments to intervene with economic incentives for fleet renewal and development of efficient technology and low carbon fuels.

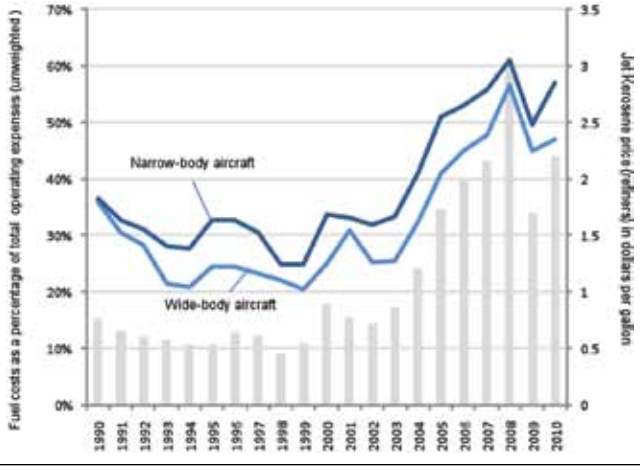
IATA's roadmap identifies efficiency technologies that could reduce emissions 20 to 35 percent per aircraft by 2050. This could perhaps be turned into operational targets by closely linking agreed rates of improvement to assumptions as to when the technologies identified will be introduced and which measures governments will take to support technology penetration, with scenarios for different oil price paths.

Figure 6: Sales and Activity-Weighted Average Fuel Burn for New Aircraft, 1960–2008



Source: ICCT 2009.

Figure 7: Fuel Costs as a Share of Operating Costs by Aircraft Family and Kerosene Prices: Large U.S. carriers 1990–2010



ITF analysis based on U.S. DOT Schedule P-5.2 and U.S. Energy Information Administration data.

The Market-Based Measures (MBMs) governments adopt are an important part of the equation as experience in Europe, with voluntary standards for CO_2 emissions reductions from cars and then regulatory CO_2 emissions standards, demonstrates. Delivery of voluntary commitments is in large part dependent on incentives created by the framework of market-based instruments. A fragmented approach between jurisdictions can weaken incentives significantly (ITF 2010b).

For aviation, such instruments could include non-discriminatory fiscal incentives for uptake of low emission technologies. They could also take the form of taxes on carbon emissions, a fuel tax or an emissions permit trading system.

Any potential instrument to address emissions from an intrinsically global business requires a measure of international agreement to be operational. As experience to date amply demonstrates, this is not a trivial requirement.

The simplest way to price carbon emissions would be to levy excise duty on jet fuel. This would be relatively inexpensive to administer. But making an international agreement to tax fuel at a uniform global rate based on the estimated monetized impact of carbon dioxide emissions is far from easy. The risk of tax competition is significant, whereby some countries could seek to attract business by taxing fuel at a lower than standard rate. For this reason above all, Article 24 of the Chicago Convention is interpreted to mean no taxation of jet fuel.

The potential for tax competition has shifted the policy focus to permit trading systems. Emission trading is attractive because, if it covers all significant emitters of CO_2 in all sectors of the economy, cuts in emissions will be made first where they are cheapest and do least overall economic damage. Emissions trading systems are also most efficient when they cover emissions from all parts of the globe. On the negative side, emissions trading systems are more expensive to operate than fuel taxes. There is also some potential for distortion of markets—creating economic rents and barriers to competition—in the way permits are distributed.

One potential disadvantage of emissions trading in a more political sense is the complexity of how it works. Aviation appears likely to be able to pass on much of the cost of any permits in ticket prices. The effect of including aviation in a trading system can thus be expected to be mainly to raise the price of carbon on the market, resulting in deeper cuts in other parts of industry without much impact on activity levels in aviation. This might lead to calls from some quarters for specific measures to curb aviation emissions in addition to emissions trading, even if that clashes with cost-effectiveness.

On the other side of the political economy coin, inclusion of aviation in emissions trading would provide the opportunity to end some poorly targeted climate change measures, such as departure taxes, introduced at some airports as part of policies to reduce greenhouse gas emissions.

In the absence of a global emissions trading system, the E.U. now plans to include flights arriving in Europe and departing from Europe in its regional emissions trading system as of January 2012. This has been challenged by U.S. airlines and the Air Transportation Association of America in the London courts as a breach of the Chicago Convention and referred to the European Court of Justice. A decision is due shortly.

Meanwhile, at its meeting in November 2011, ICAO's Council adopted a working paper calling on the E.U. and its Member States to exclude non-E.U. carriers from the E.U.-ETS. An accelerated effort for ICAO Member States to agree MBMs that could be applied globally might be the way forward.

In the meantime, the E.U. offers to exempt flights from countries or regions that adopt what it considers equivalent measures. This may in itself prove distorting. For example, fuelling with biofuels is expected to be treated as an equivalent measure to emissions trading, qualifying airlines using biofuels for exemption from the ETS. For road transport, the GHG-reduction credit for biodiesel under the E.U.'s low-carbon fuel standard is based on its estimated actual life-cycle emissions compared to conventional diesel. A similar life-cycle emissions estimate for aviation biofuels would avoid distorting the biofuel market.

The difficulties of finding agreement on emissions trading systems, European or global, does raise the question of whether negotiating a non-discriminatory fuel excise tax regime at a non-zero level, to internalize CO_2 emissions, might actually be a no more complicated task that could result in a more robust market-based instrument.

Greener Growth

Industry has tremendous capacity to compress costs and innovate once commercial scale production starts. Like road transport, aviation faces the twin challenges of developing low carbon fuels over the longer-term and, above all, stimulating an acceleration in the improvement of the efficiency of conventional technologies in the shorter-term.

Aviation is a rapidly expanding sector of the economy and critical to future growth prospects. It involves high added-value industries in both the service and industrial sectors. Investment in low-carbon technologies for aviation, as for cars, will be central to efforts worldwide to building a greener and more prosperous world for all. ■

Footnotes:

1 All aviation = 2.6 percent of total CO_2 emissions from fuel combustion, International aviation = 1.5 percent of total CO_2 emissions from fuel combustion (IEA 2010).

2 The *China Low* scenario plots the possible impact on global emissions were China to adopt policies to steer the country towards Japanese style patterns of car ownership and use (superimposed on sustained fuel economy improvements worldwide). Strong intervention would be required because of the differences in the spatial pattern of development between China and Japan.

WFP Aviation

Meeting the Air Transport Needs of the Humanitarian Community

In times of natural disaster or conflict, communities can quickly become displaced, isolated and left without proper access to food, water and shelter. A rapid response can save lives and air transport is often the only way to quickly move supplies and personnel to where they are needed.

While commercial carriers fly personnel between major cities and ships deliver bulk food provisions to the nearest ports, humanitarian carriers such as UNHAS operate at the front lines, going "where no one else goes." In this special report, Andy Cole of the UN World Food Programme (WFP) highlights aviation's important contributions to the global social sustainability pillar.

Photos courtesy of WFP

Whether the cause is flood or earthquake, cyclone or war, services such as the United Nations (UN) Humanitarian Air Service (UNHAS) provide air transportation for emergency response and rehabilitation efforts to some of the world's most remote and insecure places.

The UN World Food Programme (WFP) has operated an aviation service since the 1980s, initially established to transport food and non-food items and open humanitarian corridors in Ethiopia, Somalia, Angola and Sudan.

Pierre Carrasse, head of the WFP's Aviation division which runs UNHAS, puts it very simply: "We go where no one else goes."

Moving Cargo and Expertise

It has become apparent over the years that where food and supplies are required, so too is professional expertise. Floodwaters, fighting or straightforward lack of infrastructure often need long term support for reconstruction, agricultural rehabilitation, and health and education activities.

With increasing demand to move people, WFP initiated passenger services some years ago using small aircraft to get humanitarian staff in and out of remote areas and conflict zones. In those days, many development agencies did the same, each with their own operational requirements. The result, says Carrasse, was "many aircraft, partly loaded, all going to the same location at similar times." The need for greater efficiency was recognized and, in Somalia in 1996, WFP was assigned to lead the first UN Common Air Service (UNCAS), the foundation for UNHAS services WFP Aviation provides for the humanitarian community today.

Partnership with ICAO: Systematizing Safety

Working with chartered planes and crews in challenging terrains carries a range of risks. In 1999, a UN humanitarian flight crashed on its way to Pristina in Kosovo,

caused by a combination of pilot fatigue and faulty navigating equipment. Following the crash, WFP established an Aviation Safety Unit in 1999, as an independent body to monitor safety risk and assurance of its aviation operations, as well as to disseminate ICAO-approved aviation safety information. WFP also worked with ICAO to develop the AVSTAD UN aviation standards and has twice been audited by ICAO to confirm AVSTAD compliance.

Acknowledging the importance of a coordinated approach to humanitarian air transport, the UN High Level Committee on Management formally mandated WFP in 2003 to operate and manage air services to all UN humanitarian agencies and their partners. With this official directive, UNHAS was born. The service has since grown to become the primary air transport operator for the global humanitarian community, having flown more than 327,000 hours carrying more than 1.4 million passengers and 440,000 metric tonnes of cargo.

WFP AVIATION IN NUMBERS: 2010

- 870 humanitarian agencies served
- 350,534 passengers flown
- 14,833 metric tonnes of cargo delivered
- 49,046 hours flown
- 240 destinations in 20 countries served through UNHAS or WFP Aviation special operations in Afghanistan, Central African Republic, Chad, Democratic Republic of the Congo, Ethiopia, Guinea, Haiti, Iraq, Liberia, Nepal, Niger, Pakistan, Republic of South Sudan, Republic of the Congo, Sierra Leone, Somalia, Sudan, Tanzania, Uganda, Yemen.
- 214 medical evacuations
- 103 security evacuations
- 256 aviation professionals trained

In 2011, UNHAS provided an estimated 80 percent of global humanitarian transportation, serving 13 countries. The International Red Cross, Médecins sans Frontières, Aviation Sans Frontières-France, ECHO Flight (European Commission for Humanitarian Office) and Mission Aviation Fellowship, a religious agency, also operate small numbers of aircraft to meet specific needs.

Peacekeeping personnel are moved by a separate fleet, operated by the UN Department of Field Support (DFS). Keeping humanitarian and peacekeeping operations separate (along with minimizing reliance on aircraft supplied by host governments, especially in places experiencing civil conflict) is vital to maintaining credibility and independence.

Nevertheless, the WFP, DFS and ICAO UN agencies work together through the UN Aviation Technical Advisory Group to standardize safety and other operational parameters for humanitarian and peacekeeping aviation services. These standards range from checking that licences, insurance and civil aviation credentials are current, to checking whether potential operators have a good track record on safety and aren't supporting illicit activities in between UN flights.

This partnership has, over time, spawned additional collaborations, ranging from projects to rebuild airstrips in Sudan (co-ordinated by ICAO in Nairobi) to planning how to maintain operations

in the event of pandemic illness. Most recently, ICAO has joined the UN inter-agency Logistics Cluster, which is led by WFP, to assist in emergency response preparedness.

"This gives ICAO access that they previously didn't have to the sector," explained Carrasse. For example, when Libyan airspace was closed, the Logistics cluster had observer status at NATO deliberations, which ICAO had not previously been party to.

A Delicate Balancing Act: Financial, Environmental, Social

During the early stages of conflict in Libya and Tunisia this year, UNHAS's rapid response capabilities also enabled the safe evacuation of more than 10,500 international personnel.

"Because of our knowledge of the market and tendering system, we are well known and we were able to organise that kind of operation on short notice," noted Carrasse.

The UNHAS service in North Africa at the time of the conflict also provided access for the international media to report on the humanitarian situation.

"It's no exaggeration to say that we couldn't have run our operations in Libya without the assistance accorded us by WFP," commented World News Editor of the BBC, Jon Williams. "Many of my colleagues were spared the ordeal of long, often dangerous, journeys thanks to the UNHAS flights."

The decision for UNHAS to begin operating in any given location is not taken lightly. A thorough rapid evaluation is conducted to establish the humanitarian needs from both a donor and recipient perspective. As well, UNHAS will only consider launching an operation where no safe surface transport or viable commercial aviation options are available.

In Mali for example, UNHAS assessments in October 2011 showed that travelling by road in the country's fragile northern areas was increasingly insecure, posing greater risks to staff safety. Humanitarian agencies had begun to re-evaluate their presence. However, the need for humanitarian assistance to help local communities break the poverty cycle was as great as ever, so UNHAS sought funding to commence a new service immediately.

"In many cases, the presence of humanitarian staff depends on the availability of an air service to get them there and to get them out quickly when necessary," observed Carrasse.

Sometimes, being able to get people out quickly if a situation deteriorates enables people, and the humanitarian support they provide, to stay on the ground for longer.

Nevertheless chartering aircraft is never cheap, and many of the places UNHAS operates are land-locked countries where fuel costs are high. Significant fluctuations in demand and limited NGO budgets mean that few flights achieve full cost recovery and UNHAS relies on donor contributions to cover around 75 percent of its income ($148 million in 2010).

Revenue from cost recovery increased by 12 percent last year and a new online extension of the UNHAS Flight Management Application (FMA) being rolled out in 2011 is expected to enhance cost recovery further. Operations in the West African coastal countries of Guinea, Sierra Leone and Liberia were cancelled in 2010 due to lack of funds, however, despite strong demand.

UNHAS is continually looking to improve cost-effectiveness through route optimization, enhancing aircraft load factors and chartering the most appropriate aircraft for the job. That may mean combining services with other humanitarian operators to increase network coverage or make a route more economically viable.

"Where we can, we collaborate," confirmed Carrasse. "We do a lot of capacity-building with local operators and staff and as soon as there is a viable alternative, we go."

Lowering operating costs also directly reduces greenhouse gas emissions. UNHAS's 49,046 flying hours in 2010 emitted more than 51,000 tonnes of greenhouse gas (expressed as tonnes of carbon-dioxide equivalent, or tCO_2e). Airlift operations in a single country can emit thousands of tonnes of CO_2e in just a few months.

ICAO's efforts to reduce the aviation sector's GHG emissions and environmental impact stands to influence the sustainability of all UN operations, since travel represents about 50 percent of the global UN GHG emissions inventory. Across the UN, official travel comprised 868,116 tCO_2e out of the UN's total footprint of 1.7 million tCO_2e in 2009.

WFP and ICAO are working together to refine methodologies and utilise the online Flight Management Application to calculate CO_2 emissions from UNHAS flights and emergency food airlifts for each client agency. This is more complex than it sounds, given the irregular routing of UNHAS flights, precisely because the pilots won't stop at a scheduled location if no-one is getting on or off the plane. Taking-off and landing uses more fuel than staying in the air.

Carrasse says programmes such as the UN-wide Climate Neutral initiative, announced by Secretary General Ban Ki-moon in 2007, have spurred UNHAS to look even more closely at opportunities to improve efficiency. UNHAS carries much less freight than it used to and the approach of airlifting only as a last resort is entirely in accordance with sustainability principles, which seek to minimize environmental impacts.

When there is no alternative, however, then UNHAS will be there, from Pakistan to Haiti, Niger to Somalia, bringing food, medical supplies and expertise to support the social, economic and even environmental well-being of the world's most vulnerable people. ■

Aviation's Impacts: A Broader perspective

Sustainability is a complex notion that seeks to define not only environmental impacts but also the balance between these impacts and ongoing social and economic development objectives. Recent perceptions of aviation sustainability, however, have tended to only focus on its negative environmental impacts.

As Alan Melrose and Rachel Burbidge of the EUROCONTROL Environment Unit write, the current shift towards a more comprehensive notion of sustainability, one that includes the full socio-enviro-economic balance to be considered, is a positive step for aviation that should be encouraged and supported at every turn by air transport stakeholders.

With over 300 definitions and counting, 'sustainable development' is a concept which means different things to different people. At the governmental level, however, sustainable development is often taken to mean *"… development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

This was the definition adopted by the United Nations World Commission on Environment and Development (commonly know as the Brundtland Commission) in 1987. Sustainability has since been widely interpreted as achieving the continual balance of social, economic and environmental imperatives, which at their most basic can be portrayed as shown in Figure 1 *(below)*.

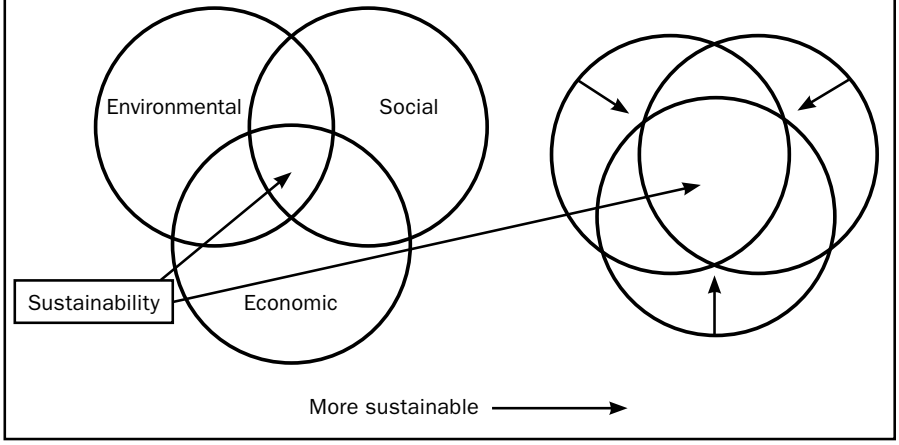
When applied to aviation, however, this broad sustainability concept is often constrained to mean 'reduce environmental impact as much as possible', with lesser focus being given to aviation's more positive contributions to both local and global sustainability.

In fact, aviation brings significant sustainability-related benefits, such as freedom of mobility and health and welfare improvements through poverty reduction. It also promotes substantial economic benefits through employment opportunities and facilitating trade and business. This was demonstrated by the multi-billion dollar impact of the 2010 volcanic ash crisis.

Aviation can therefore be viewed as making a positive contribution to sustainability if on balance it demonstrates an overall reduction in adverse enviro-socio-economic impacts and/or an increase in positive enviro-socio-economic impacts.

It is true that aviation also incurs sustainability costs such as finite resource depletion, noise, atmospheric emissions which contribute to reduced local air quality and climate change, water and land pollution, and various associated adverse health impacts. Despite the aviation industry's ongoing attempts to reduce them, very often, these negative effects overshadow the positive ones.

Figure 1: The Sustainability Paradigm



Advancing Sustainability Frameworks

If aviation is to continue to play a role in newly emerging visions for sustainability, it must demonstrate that it can deliver a positive balance across social, economic *and* environmental metrics. Furthermore, all practical opportunities to minimize adverse impacts should be seen to be achieved, otherwise aviation will not be perceived by society as achieving the required balance.

Most sustainability cost reduction measures that are presently reaching maturity fail to offset the impact of increased growth in the aviation sector. Moreover, air transport will not become more sustainable in the longer-term without a major step change in both technology and our understanding of aviation's contribution to global society.

AVIATION'S SUSTAINABILITY-RELATED BENEFITS

- Freedom of mobility
- Leisure
- Improvement to health through poverty reduction
- Cultural enrichment and diversity
- Employment
- Technology transfer
- Major direct, secondary and indirect economic improvement
- Global business links
- Connecting global society
- Military security
- Positive globalization effects such as promoting economic development and trade

Consequently, if this growing demand is to be met in the future with all attendant benefits, society (and not just aviation) may have to accept one or both of the following:

- Accelerated investment to develop and implement a step change in aviation technology that eliminates one or more of these costs.

- Making the costs acceptable. For example, this could be achieved by freeing environmental capacity elsewhere by investing in emissions reductions in sectors with a broader choice of energy sources. It has to be borne in mind, however, that this may work for CO_2 emissions but not for local impacts such as local air quality pollution or aircraft noise. Moreover, if the production of contrails and aviation induced cloudiness is proven to be significant—then this is not transferable to other sectors either.

Without these changes aviation's growth will be inhibited. Globally, we will witness a reduction in mobility leading to significant social exclusion and an overall negative impact on the key sustainable development goal of intra-generational equity.

The Need to Foresee Cascading Sustainability Impacts

While flight fuel efficiency will remain important from a cost perspective, the value of flight efficiency from a climate change perspective is actually reduced as the introduction of bio-fuels and carbon off-setting increases. If we are so certain that bio-fuels and offsetting will be effective, then surely the CO_2 benefits for operational improvements—while essential—may be short lived. We need to consider therefore whether this is being factored into business cases in the air traffic management sector.

For example, noise-driven restrictive procedures and runway use can result in artificially reduced capacity and accelerated demand for new runway development. They may even lead to safety compromises and there is evidence that they trigger unforeseen but significant system-wide effects. For instance, a local rule being enacted at an airport can cause unnecessary holding of aircraft in the air, resulting in additional track-miles and non-optimal vertical profiles. These in turn lead to delay, additional atmospheric emissions and resource depletion.

Land-use planning failures can similarly lead to inappropriate residential development and a resulting increase in the population affected by aircraft noise. This in turn can lead to calls for airport constraints and even airport relocation (with attendant sustainability costs) and expensive, protracted runway planning approvals due to noise considerations. These often result in conditions that reduce the useable capacity of a social asset that was already expensive to deliver (in sustainability terms).

From a sustainability perspective then, where maximizing the use made of existing assets would be logical, it seems counter-productive to risk the triggering of real and significant sustainability impacts through noise restrictions of this nature without a requirement to transparently assess or consult.

This leads on to one further example of the often inherent tensions in sustainability decisions. No one would deny that reducing aircraft noise is a sustainable aim from a human health perspective. If, however, the reduction in noise entails airport capacity constraints for an airport surrounded by areas of poverty, the outcome becomes less certain. Poverty reduction is perhaps the most important global mechanism to improve human health and a successful airport can play a major role in this regard.

It is clear, therefore, that aviation-related sustainability issues and interrelationships are neither intuitive nor easy to understand or manage effectively. Nor are the sustainability-related issues facing aviation solely confined to aircraft-related impacts on the environment, which is the traditional territory for aviation 'environmental' interests. Collectively, aviation may need to move to a 'sustainability platform' to be able to offer well founded arguments to retain its licence to operate and grow sustainably.

Sustainability Platform

To move the entire aviation community to such a sustainability-oriented platform may require a change in how aviation views its overall performance. For example, there is a strong argument for including safety and security within the boundaries of sustainability issues, as well as cost-effectiveness and capacity provision. These are not currently viewed in this light, however, and the socio-economic benefits arising from such improvements are not always captured and used to justify investment.

Changing the present, rather limited performance perspective which uses environmental benefits as the sole

indicator of sustainability may prove to be crucial to aviation's future. To achieve this, we need to develop uniformly world-class capabilities in the following areas:

- Ensuring that society understands and recognizes the high sustainability performance already achieved and the significance of environmental benefits brought about by improvements in all Air Traffic Management Key Performance Areas (ATM-KPAs).
- Widespread access to commonly-agreed sustainability based assessment methods, with standardized inputs and assumptions where possible
- Significant decisions being taken on the basis of effective and comprehensive sustainability assessments.
- A recognition that the sustainability of aviation is a societal issue and a collective human responsibility and that public support for sustainability improvements may need to be significantly increased and/or that other sectors may need to take on board some of the burden of change
- Aviation's sustainability performance should be judged against a base-case that includes the accommodation of future demand (i.e. the future do-nothing scenario). We should move away from the widespread practice of justifying change by comparing future performance against the present situation.
- Our people (at all levels) should be fully aware of the sustainability-related implications of their personal actions and the risks and opportunities facing any initiatives they are involved in. This requires effective monitoring, training and reporting processes to maintain buy-in.
- Ensuring collaboration on this shared challenge at every level so that, as far as is possible, the maximum sustainability performance is achieved by all parts of aviation. Here there is a need for initiatives such as Collaborative Environmental Management (CEM)[1].
- Eliminating the impediments to improved sustainability performance of aviation, where these exist, which will in turn require the correct understanding and information on the different sustainability performance elements (for example environment may need to be sacrificed for security if this proves to be more sustainable).

Conclusions

One thing that is certain is that aviation faces ever more public scrutiny on the value it offers to society and on the associated costs it imposes. Under this scrutiny we will be

increasingly challenged to demonstrate that an acceptable socio-enviro-economic balance is being achieved and maintained. This shift towards a platform of 'true sustainability' from the present 'environmental sustainability' is a positive move for aviation. We need, however, to make sure that we focus on getting those benefits recognized in international debates on sustainable development.

For example, aviation demonstrates significant overall benefits in terms of economic performance—but how often are operational improvements expressed in these terms? Further, subject to noise impact management, aviation has a broadly positive impact on social performance (e.g. safety, security, leisure, mobility, poverty reduction, technology transfer, etc.), but again, how often does the industry as a whole, or even individual aviation stakeholders, demonstrate their performance here?

Although it is essential therefore to keep working towards improving environmental sustainability, as long as aviation remains focused exclusively on the environmental efficiency gains achieved the situation will be less positive. Opportunities such as next year's United Nations Conference on Sustainable Development 2012 (Rio+20) must be seized to emphasize aviation's rounded contribution to overall sustainable development goals.

The Rio+20 Conference will focus on instigating a move towards a global green economy with its aims of achieving a *"balanced consideration of social, economic and environmental goals and objectives in both public and private decision-making"*[2]. Establishing the positive contributions which aviation can make to such objectives is essential.

Overall, therefore, the true 'sustainability platform' is one where aviation can present a very positive message. If we restrict our discussion with society to the environment alone, the message is far less positive and may ultimately be unwinnable. ■

Footnotes:

1 For further information on CEM please see http://www.eurocontrol.int/environment/gallery/content/public/documents/CEM_final_17%2011%2008.pdf

2 United Nations. http://www.uncsd2012.org/rio20/index.php?menu=62

ICAO AIR TRANSPORT SYMPOSIUM

18 – 20 APRIL 2012

http://www2.icao.int/en/iats

visit website

In partnership with the Air Transport Research Society

Strategies and Tools for Sustainable Air Transport

18 – 20 April 2012, ICAO Headquarters, Montréal, Canada

The ICAO Air Transport Symposium (IATS), which will take place from 18 to 20 April 2012 at ICAO Headquarters in Montréal, Canada, will provide an updated picture of the air transport industry, and will examine specific trends such as consolidation and emerging air carrier models. An outlook into the future of the industry will be provided which will address challenges posed to the sustainable development of air transport.

The Symposium, entitled "Strategies and Tools for Sustainable Air Transport" will provide a forum for interactive discussions and useful views from the civil aviation stakeholders that will assist in the preparation of the Sixth Worldwide Air Transport Conference (ATConf/6) to be held at ICAO Headquarters from 18 to 22 March 2013.

Speakers will include high-level representatives from airlines, airports, States, air navigation services providers, aircraft manufacturers, financing institutions and international organisations. The event will attract a wide variety of professionals from the air transport industry, civil aviation authorities, academics, air transport lawyers and consultants.

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Polish Presidency in the Council of the European Union

History

Milestones

1789 First balloon flight in Poland.

1910 First aeroplane flight in Poland.

1919 Establishment of the first civil aviation administration.

1921 Regular passenger connection Warsaw-Prague-Paris.

1922 First Polish airline, Aerolloyd established.

1928 Establishment of PZL, a state-owned aircraft manufacturer.

1928 First aviation law issued.

1929 LOT Polish Airlines founded.

1933 First crossing of the Atlantic by a Polish aircraft.

1934 International airport in Warsaw opened (now Warsaw Chopin Airport).

1944/45 Poland becomes first Contracting State to ratify Chicago Convention.

1950s First Polish jet aircraft and helicopter manufacturing established.

1958 A golden era of achievements in air sports begins (soaring, precision and rally flying, glider aerobatics), a long series of medals at World and European championships.

1968 Jet airliners enter service in LOT Polish Airlines.

1973 First direct Warsaw-New York connection established.

1990 Accession to European Civil Aviation Commission.

2002 New aviation law enshrined and establishment of Poland's Civil Aviation Office.

2004 Rapid growth of air transport market after accession to the EU.

2004 Accession to EUROCONTROL.

2008 USOAP audit confirms high level of implementation of ICAO safety Standards.

Indu

Competitive advantages of Poland's strong aviation manufacturing industry:

- Over 70 years of tradition and experience.
- More than 23,000 highly qualified staff.
- More than 100 internationally recognized companies.
- Concentration of more than 90 percent of production in a cluster in South-Eastern Poland.
- Yearly sales exceeding $1 billion (€800 million).
- Well prepared investment areas (Aeropolis Science and Technology Park www.aeropolis.com.pl, and Bielsko Aviation Technology Park www.parklotniczy.pl).
- Strong aeronautical research and academic centres in Warsaw, Rzeszów, Gliwice, Lublin and Wrocław.
- Fruitful and intensive cooperation between research centres and manufacturers through Poland's Centre of Advanced Technology "AERONET - Aviation Valley" www.aeronet.pl

stry

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- M28 – passenger and cargo aircraft
- M28B BRYZA – versatile, STOL, passenger/cargo and maritime search and rescue aircraft
- M18 DROMADER – firefighting and agro operations aircraft

Swidnik
Manufacture of SW-4 and W-3A Sokół helicopters

Warszawa
Aerostructures and aircraft systems manufacturing

Rzeszów
Engines and engine components

Bielsko-Biała
Gliders and ultra-light aircraft

- Expanding network of international airports (currently two under construction in Lublin and Modlin) as well as local aerodromes.
- Active presence of world's leading aerospace engineering companies: GE, Hamilton Sundstrand, Agusta Westland, Pratt & Whitney, Sikorsky, United Technologies, Hispano-Suiza, MTU Aero Engines, Avio, Goodrich, Vac Aero, EADS.

Did you know that in almost every airliner in the world there is at least one part that was made in Poland?

Air transport in Poland

Since its accession to the European Union in 2004, Poland's airports increased their traffic figures by 130 percent. The most dynamic growth was observed in regional airports that had four times more passengers in 2010 compared with 2004.

Carriers with the biggest market share are: LOT Polish Airlines, Wizzair, Ryanair, Lufthansa and EasyJet.

During the period shortly after the accession there was enormous growth witnessed in scheduled flights due to the appearance of low-cost carriers. Since 2007 Poland has also now seen significant growth in its charter segment, which currently represents 15 percent of its air transport market.

It is projected that the air transport market in Poland will continue to grow at an average yearly rate of 6 percent. By 2020 its airports will be processing more than 37 million passengers annually.

Civil Aviation in Poland – a few figures (2011)

Aerodromes	54
AOC holders	20
AWC holders	39
Handling agents	31
Design, production, maintenance and continuing airworthiness organizations	246
Flight training organizations	157
Licences issued (including UL, hang-gliders, paragliders, parachutes, etc., and approvals)	14,762
Registered aircraft	2093
Foreign carriers (scheduled operations)	38
Polish carriers (scheduled operations)	4




Poland's Civil Aviation Authority

The Civil Aviation Office serves as the official aviation authority of Poland. It consists of 13 departments and employs more than 330 staff.

Competencies:

- Safety, security and economic oversight.
- Certification of aviation organizations.
- Personnel licensing.
- Maintenance of civil aviation registries.
- Drafting of civil aviation regulations.
- Negotiations of air transport agreements.
- International cooperation in the field of civil aviation.

The Civil Aviation Office cooperates closely with ICAO, EUROCONTROL and the European Civil Aviation Conference (ECAC). It takes an active part in EU decision-making processes through the Aviation Working Party of the Council of the European Union, European Commission committees and the European Aviation Safety Agency (EASA).


Innovative ICAO Conference Facilitates Negotiations on New Air Services Agreements

Air services agreements provide the legal basis for the operation and expansion of international flights between countries. They define essential operational elements such as the cities to be served, the number of flights to be flown and the type of traffic to be carried. No international operations would be possible without these agreements.

ICAO's Air Services Negotiations Conferences (ICAN) provide an innovative and practical means by which ICAO Member States can conduct multiple bilateral air services negotiations in a single location, greatly improving the efficiency of the negotiation process. As Yuanzheng Wang, Manager of the Conference and Air Transport Officer in the ICAO Economic Analysis and Policy (EAP) Section writes, the agreements produced at the ICAN could contribute to the air transport sector's recovery from the recent economic downturn and its future growth.

ICAO's Air Services Negotiations Conferences (ICAN) provide an innovative and practical means by which ICAO Member States can conduct multiple bilateral air services negotiations in a single location. ICAN events greatly improve the efficiency of the negotiation process by avoiding situations where a State would have to travel separately to each of its partner States to conduct its talks. They also permit ICAO's Members to engage in regional, plurilateral or multilateral negotiations on a one-stop basis if needed.

The first ICAN was held in Dubai in 2008. It was attended by 27 States and resulted in the signing of more than 20 agreements. Building on its success, ICAO held ICAN2009 in Istanbul where 52 States signed some 60 agreements. A similar number of negotiations were finalized at ICAN2010 in Montego Bay, Jamaica, where 38 States were in attendance.

"What the negotiators produce at each ICAN directly shapes the operating environment for the global airline industry,"

The Conference was officially inaugurated by Indian President Smt. Pratibha Patil (left), who in her keynote speech commended ICAO for its leadership in promoting ICAN so successfully in partnership with host countries.

explained Folasade Odutola, Director of the ICAO Air Transport Bureau (at the time of this writing). “Air service agreements lay the groundwork for air carriers to plan their services and initiate new flights when the conditions become favorable in the target markets.”

This year’s ICAN (ICAN2011) was the fourth such event organized by ICAO but the first one held in Asia. It was hosted by India’s Ministry of Civil Aviation (MCA) and coincided with the country’s centennial celebration of its commencement of commercial aviation operations. ICAN2011 attracted a record attendance of some 350 delegates from 64 States and four regional organizations.

The Government of India attached great importance to ICAN2011 and its Ministry of Civil Aviation, working together with various government departments and local airline/airport/tourism stakeholders, provided excellent facilities and services to the negotiating teams. The Conference was officially inaugurated by the President of India, who in her keynote speech commended ICAO for its leadership in promoting ICAN successfully in partnership with host countries.

Other dignitaries present at the opening included the President of the ICAO Council, India’s Minister of Civil Aviation, the Union Minister of Heavy Industries and the Governor of India’s Maharashtra region. Dr. Nasim Zaidi, India’s Secretary of Civil Aviation, served as Chairman of the conference.

The opening ceremonies were followed by a seminar session where delegates learned about the latest developments in air transport liberalization and discussed related issues. Panellists, selected from a cross-section of States and regions, shared their experience and insights on some topical issues of air transport liberalization.

The panellists from ICAO informed the meeting of the role of ICAO in the liberalization process, the decision of ICAO Council to convene a worldwide air transport conference in early 2013 and the main issues to be covered by that conference. The seminar was appreciated by participants and many voiced support to the work of ICAO in the field of air transport policy and regulation, confirming the Organization’s relevance and value and urging it to strengthen its activities in this area.

The Government of India made use of the ICAN2011 opportunity to organize a separate African Session during the first day. Participants discussed the development of Africa-India relations and the expansion of air transport connections between the two continents.

In the short span of four and a half working days, the ICAN2011 aviation negotiators held over 370 formal and informal bilateral meetings leading to the signing of more than 120 bilateral air services agreements and arrangements (e.g. MoUs). With the experience of the previous ICANs, many delegations came well prepared and conducted their negotiations in a very efficient and effective manner (e.g. Jamaica’s delegation held 20 meetings and signed 15 agreements/arrangements).

“These agreements help improve the economic environment of the airline industry, which in turn leads to more and better air services for the travelling public and better commercial opportunities for shippers and forwarders,” concluded Roberto Kobeh González, President of the ICAO Council.

Roberto Kobeh González, President of the ICAO Council, stressed at the India event that ICAN agreements help improve the economic environment of the airline industry, which in turn leads to more and better air services for the travelling public and better commercial opportunities for shippers and forwarders.

"ICAN provides a very convenient and essential platform. It allows a large number of States to negotiate these bilateral agreements quickly, efficiently and with significant savings in time and expenditure."

Smt. Pratibha Patil, President of India

While the success of the conference is clearly evidenced by the number of agreements/arrangements signed, more important are the opportunities ICAN2011 provided to participants to meet with their counterparts, old and new. These largely informal meetings help achieve a better understanding amongst aviation partners and open the doors for improved future aviation relations and air transport services.

Feedback received from delegations to the conference was overwhelmingly positive. Many delegates commended ICAO for this innovative facility and expressed strong support to the Organization's continuation of this event. The delegations stressed that they consider the ICAN process a very cost-effective means of conducting their air service negotiations or consultations, bringing tangible results and benefits.

The ICAO organizing team for ICAN2011 (from right to left): Yuanzheng Wang, Manager of ICAN2011; Lina El-Taweel; Magda Boulos; and Susan Brain, all from the ICAO Air Transport Bureau.

The ICAO Secretariat took the opportunity at ICAN2011 to formally recognize the tremendous contributions of all the States which have hosted previous ICAN events. The ICAO organizing team designed and awarded a special flag to each. At the closing ceremony, specially designed pennants were also awarded to the "Most Productive Delegation" (the delegation from the United Kingdom which conducted the most meetings) and the "Most Accomplished Delegation" (the Jamaican delegation which signed the most agreements).

"ICAN brings tremendous cost saving to States. From our own experience, the cost of hosting the ICAN in Jamaica was approximately the same amount as would be required for our delegation to do one trip to Asia for bilateral negotiations," remarked Lt. Col. Derby, Director General of Jamaican Civil Aviation Authority and host of ICAN2010.

Delegates from many smaller, particularly developing countries shared similar sentiments regarding the cost-effectiveness of the ICAN process. The savings generated for ICAN2010 participating States, for example, has been estimated at close to $10 million. Recognizing the success and benefits of ICAN, the ICAO Assembly adopted Resolution A37-20 last year, which in part encourages States to make use of and benefit from this unique ICAO innovation in international affairs.

"ICAN provides a very convenient and essential platform," concluded India's first female President, Smt. Pratibha Patil. "It allows a large number of States to negotiate these bilateral agreements quickly, efficiently and with significant savings in time and expenditure." ■

Commercialization/Privatization Database Provides Case Studies for States, Airports, ANSPs, Policy-Makers and Analysts

In 2008, a new database entitled *Case Studies on Commercialization, Privatization and Economic Oversight of Airports and Air Navigation Services Providers* was published on ICAO's website at the initiative of the Secretariat. Seven cases were included at that time describing the process of commercialization and privatization of airports and Air Navigation Services Providers (ANSPs) in Argentina, Australia, Canada, Germany, South Africa, the United Kingdom, and the United States.

As Philippe Villard and Julián de la Cámara of ICAO's Economic Analysis and Policy Section write, the database has been significantly updated during 2011 to include revisions to the seven existing case studies and the addition of 19 new ones.

The ICAO database on *Case Studies on Commercialization, Privatization and Economic Oversight of Airports and Air Navigation Services Providers* was originally produced by the ICAO Secretariat in 2008. The data used to develop it at that time included corporations' and governments' reports, studies on airports and ANSPs, various Web-based sources and the aviation press.

THE 26 STATES INCLUDED IN THE ICAO AIRPORT/ANSP CASE STUDIES DATABASE

1. Argentina
2. Australia
3. Belgium
4. Bolivia
5. Brazil
6. Cameroon
7. Canada
8. Chile
9. China
10. European Union Directive on Airport Charges
11. France
12. Germany
13. India
14. Japan
15. Jordan
16. Malaysia
17. Mexico
18. Netherlands
19. New Zealand
20. Peru
21. Senegal
22. South Africa
23. Thailand
24. Turkey
25. United Kingdom
26. United States

The case studies database constitutes an informative tool for both the ICAO community and for students and practitioners of the air transport industry. Originally including studies on seven State experiences in this area, the expansion of the database during 2011 to include 19 additional briefings responded to three complementary rationales.

Firstly, there was a need to add geographical diversity to the existing analyses. The commercialization of airports and air navigation services constitutes a worldwide trend that affects countries in every continent. It was therefore deemed appropriate to add more countries from all regions, most notably Asia (e.g. China or Japan), Latin America (e.g. Chile or Brazil), the Middle East (e.g. Jordan) and Africa (e.g. Cameroon or Senegal).

Secondly, it appeared necessary to expand the database in order to include the different approaches in the commercialization of airports (privatization in the United Kingdom, private participation in France, long-term concessions in Mexico, etc.) and in their economic oversight (light-handed regulation in New Zealand, yardstick regulation in Jordan, contract regulation in Chile, etc.).

Thirdly, it was deemed a natural fit for ICAO to publish and enhance these studies since their content is related to a core evolution in the provision of airport and air navigation services.

The studies are divided into five components:

a) A background section explains the evolution of airport and air navigation services administration and policy and maps the airport system (number of airports, geographical features, etc.).

b) An airport commercialization/privatization section describes the evolution of airport ownership and administration (in most of the cases, independent entities were established for the purpose of operating and managing one or more airports with variations in terms of ownership of these entities among the States).

c) A section on commercialization/privatization of ANSPs presents the evolution in the provision of air navigation services (conversely to airports, change has been limited in this sector).

d) An airport economic oversight section focuses on the policy, administrative and economic mechanisms imple-mented by the States to supervise commercial and operational practices of airports.

e) A section that describes the same mechanisms of regulations for the provision of air navigation services.

A Tool for Policy-Makers, Policy Analysts and Practitioners

Several academics and policy-makers have published analyses and reports that deal with the commercialization of airports and ANSPs . Most prominently, the academic community has contributed to a number of articles and books comparing related experiences in this area in different States.

Regarding airports, some of the examples include Oum et al., who compare the effect of ownership forms of the world's major airports to assess their performance[1]. Forsyth et al. describe the different mechanisms for airport economic oversight in different regions of the world[2]. Padova, meanwhile, maps airport policy reforms in several countries[3].

Regarding air navigation services provision, Button and MacDougall analyze the different models for supplying air traffic control according to several institutional dimensions[4]. Jones and Guthrie study the different mode of governance for ANSPs in 40 countries[5], and Curchod et al. analyze the commercial orientation of air navigation services in several countries[6].

The scope of the ICAO database is nevertheless different. The Organization's case studies do not aim to conclude on the efficiency of policy change in the field of air transport infrastructure ownership and management, but rather seek to provide information and data to a variety of potential readers.

Indeed, the briefs are aimed at a wide audience. Beyond the broader civil aviation community, airport and ANSPs managers, Civil Aviation Authorities (CAAs) and policy-makers may find an interest in learning how other States have dealt with the commercialization of airport and air navigation infrastructure.

Each case presents the features of national policies, the structure of airports and ANSP management, the pace of change in ownership, and related oversight mechanisms. From a perspective of policy transfer and policy learning, the data offer an interesting avenue. The academic community may also use the database to find contextual information on which research and analysis can eventually be built.

As it may be difficult to access institutional sources of airport and ANSP policies in some countries, the ICAO briefs represent a valuable reference. Students in the civil aviation sector may also find it useful to consult the different situations specific to each case and get acquainted with the issue of airport/ANSP commercialization and privatization. Written without excessive technicalities, the database may be accessed free of charge.

Finally, the case studies are of great importance to the ICAO Secretariat itself, as well as other international organizations. For example, the findings contained in the different briefings highlight the major trends affecting air transport infrastructure management, policy and oversight, and are used for the update of the ICAO Circular on the *Privatization in the Provision of Airports and Air Navigation Services*[7].

The case studies provide a useful collection of data that can serve the entire civil aviation community. It is a living database which will be updated regularly according to changes planned by States to commercialize or privatize their air transport infrastructure (or that have already started this process) and expanded by the addition of new studies for States in all continents with different models of commercialization of airport and air navigation services. ■

Note to readers:

The International Civil Aviation Organization (ICAO) is neither responsible for this article nor for the content of the discussed case studies. They do not constitute an assessment or the expression of view by ICAO.

Comments on the content of the ICAO *Case Studies on Commercialization, Privatization and Economic Oversight of Airports and Air Navigation Services Providers* are welcome and should be directed to: **eap@icao.int**

The database itself is available at:

http://www.icao.int/icao/en/atb/eap/Databases/Eap_ER_Databases_CaseStudies_ANSPs.htm

Footnotes:

1 Oum, Tae H., Nicole Adler and Chunyan Yu, 2006. "Privatization, Corporatization, Ownership Forms and their Effects on the Performance of the World's Major Airports", *Journal of Air Transport Management* 12 (3), pp. 109-121.

2 Forsyth, Peter, David Gillen, Andreas Knorr, Otto Mayer, Hans-Martin Niemeier and David Starkie, 2004. *The Economic Regulation of Airports. Recent Developments in Australasia, North America and Europe,* Aldershot (UK): Ashgate Publishing.

3 Padova, Allison, 2007. *Airport Governance Reform in Canada and Abroad.* Ottawa: Library of Parliament – Economic Division, PRB 07-12E.

4 Button, Kenneth & Glen MacDougall, 2006. "Institutional and Structure Changes in Air Navigation Service-Providing Organizations", *Journal of Air Transport Management* 12 (5), 236–252.

5 Jones, Alan and James Guthrie. 2008. *Governing Modernised Air Navigation Service Providers.* Paper presented at The EGPA Study Group Conference on Governance of Public Sector Organisations, Rotterdam, 3-6 September 2008. http://soc.kuleuven.be/io/egpa/org/2008Rot/papers/Jones_Guthrie.pdf.

6 Curchod, Corentin, Hervé Dumez et Alain Jeunemaître. 2004. "Une étude de l'organisation du transport aérien en Europe: les vertus de l'AQQC pour l'exploration de la complexité", *Revue Internationale de Politique Comparée* 11 (1), 85-100.

7 ICAO. 2002. *Privatization in the Provision of Airports and Air Navigation Services* (Cir 284-AT/120), Montréal: International Civil Aviation Organization.

Metal Detection Technology for Air Cargo Screening

Assuring security in the cargo industry is becoming a bigger part of the day to day business for shippers, freight forwarders and airlines, driven by legislation in response to constantly evolving security threats.

Particularly in the air cargo sector, which is built on the promise of fast service and delivery, the additional step of screening cargo for potential threats can cause serious delays in the transport chain. Nowhere is this a bigger issue than in the transportation of perishable goods, where added time can endanger the quality of the shipped goods in a significant way.

Various screening technologies have been developed and approved for cargo inspection by regulatory authorities. Electromagnetic inspection is uniquely suited to screen non-metallic cargo, working along the same principle as metal detection by finding metallic objects in cargo that could be potential threats. Examples include components for improvised explosive devices such as detonators.

Typical commodities that can be inspected with metal detection technology are perishable goods such as fruits, vegetables, meats, seafood (fresh or frozen), and organic goods in general. Paper goods or metal-free apparel are other appropriate cargo types for screening with metal detectors.

A typical electromagnetic screening device consists of a detection tunnel, a conveyor belt which transports the goods to be inspected through the inspection tunnel and a signaling device indicating the result of the inspection.

The screening process itself is fast, easy and efficient. The goods to be inspected are placed on the conveyor and pass through the inspection tunnel. If no metallic objects are present, a green light indicates that the item has been cleared. If a metal object is found, an audio-visual alarm sounds and the conveyor stops, allowing personnel to identify the alarming item and to segregate it for secondary inspection according to the protocols in effect. All this is done without an operator needing to interpret any images.

30–50 Percent More Efficient than Conventional Screening

Some users have reported efficiency increases using electromagnetic inspection of some 30 to 50 percent compared to other screening devices which require the interpretation of an image. The economic advantages of electromagnetic scanning are even more pronounced when physical searches are considered and furthermore there is no risk of damaging the inspected goods. For some shippers, such as the producers of organic products, the fact that electromagnetic inspection systems do not use any ionizing radiation adds an additional level of peace of mind.

The metal detectors used to screen - cargo electromagnetically are not affected by temperature and can be installed directly in the refrigerated area of a warehouse to ensure that the cold chain remains intact. They are also not affected by wet or frozen products.

Particularly for perishable goods, electro-magnetic inspection through metal detection is fast, effective, efficient and is gaining growing acceptance for this particular group of commodities.

Electromagnetic inspection systems are available in sizes suitable for break-bulk all the way to inspection of entire skids. This allows screening to take place anywhere in the supply chain, from the shipper who may be screening individual boxes to the freight forwarder or airline screening larger shipments.

CEIA, a company with decades of experience in metal detection for passenger screening as well as screening of industrial products, offers four models of Electro-Magnetic Inspection Systems (EMIS) for the screening of cargo. These models cover the entire range from break-bulk screening to the capability of screening entire skids. All four models are approved by the TSA.

CEIA already has a number of units of various sizes deployed with freight forwarders in the USA and the customers are reporting significant gains in productivity and simplification of their operations. ■

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